SOUTHERN POWER AND INDUSTRY

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MAY, 1957

SPI . . . 54th Year

REACHES industrial plants (manufacturing, process, utility and large service) in the South & Southwest.

SERVES plant managers, superintendents, engineering department heads and plant operating staffs.

PROVIDES information to solve design, installation, operating and plant maintenance problems.

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ELEVENTH ANNUAL PLANT MAINTENANCE ISSUE

Reports on proven maintenance methods, procedures and techniques for Southern and Southwestern plants.

BETTER BUYING 46
Let salesmen help you

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Planning & standards pay off

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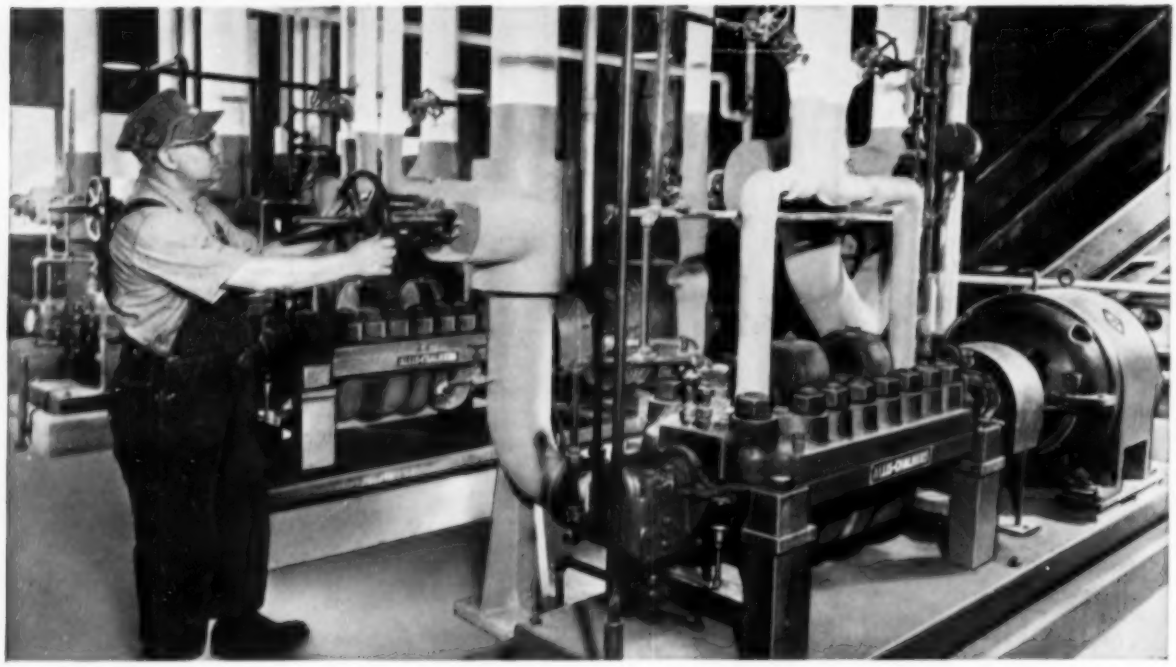
Allis-Chalmers Pumps Meet Power Plant Requirements



New Pumps Give Milwaukee County Institutions

. . . Dependable Power Service

THESE modern multi-stage high pressure pumps assure continuous, economical steam for the Allis-Chalmers 3000-kw steam turbine units at the Milwaukee County Institutions.

As new members of the Allis-Chalmers complete line of pumps, these units are designed to meet medium-high pressure, continuous service requirements of boiler feed duty in lower volume ratings.

Horizontally split casing with suction and discharge in lower half provide for simplified maintenance—without disturbing piping. Both radial and axial balance maintains close clearances and fits, gives low thrust bearing loads. Bearings are double-row ball bearings or alternate sleeve bearing with Kingsbury thrust. Sleeve and Kingsbury combinations have ring oiling as well as pressure lubrication.

You get **MORE** than a Pump . . . When You Specify Allis-Chalmers

You can take advantage of Allis-Chalmers wide experience in supplying pumps to all industries. You are assured of modern design, heavy duty construction and correct application aid — all adding up to years of dependable service.

Allis-Chalmers is the only company that can offer you "One-Source" responsibility, with a complete unit — pump, motor and control — all built to work together. For "MORE" information about Allis-Chalmers pumps, call your local A-C office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

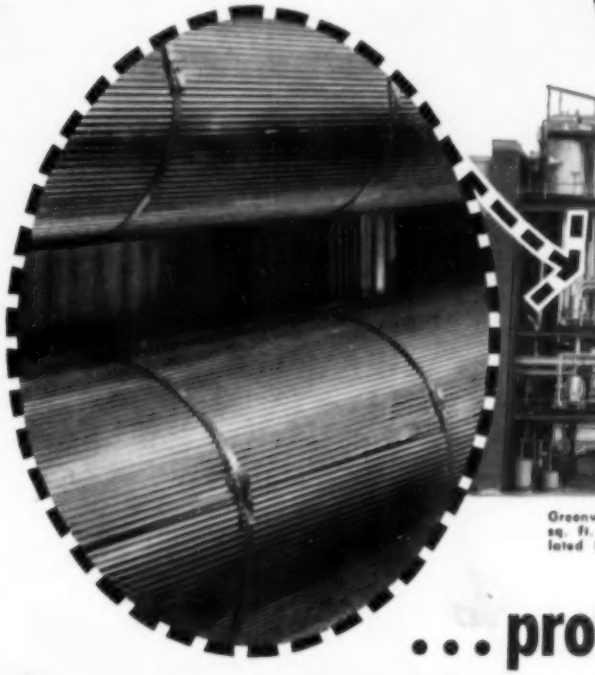
A-5098

SOUTHERN POWER & INDUSTRY is published monthly by W. R. C. Smith Publishing Co., Executive and Editorial Offices: 806 Peachtree St., N.E., Atlanta 8, Ga. Entered as second-class matter at the Post Office, Charlotte, N. C. Subscription Rates: United States and Possessions, $1.50 per year or three years for $3.00; Foreign Countries, $10.00 per year.

Volume 75 Number 5

CHILDERS JACKETING...

Increases efficiency of insulation



Greenwood Mills, Greenwood, S. C., uses over 100,000 sq. ft. of .006" Childers Jacketing to protect insulated lines at its newly-completed Mathews Plant.

W. L. Bross, Chief Engineer at Greenwood Mills

...protects insulated lines, decreases heat loss, improves appearance

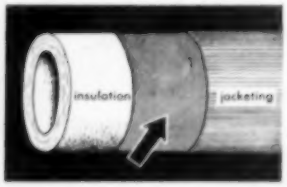
Leading power plant engineers are discovering to their profit that insulation on steam lines *lasts far longer* when protected with Childers Aluminum Jacketing. This durable jacketing eliminates costly maintenance and repairs. It protects the insulation indefinitely against damage from workmen, equipment and dripping fluids like oil and grease. Outside lines covered with Childers Jacketing are safe from exposure to weather. Periodic inspection of the insulation is easy with the removal of any section of jacketing.

Childers Jacketing on power plant lines and equipment has the added benefit of *effectively reducing the heat lost by radiation.* Engineers have determined that Childers Jacketing improves the efficiency of insulation and therefore decreases fuel consumption. The result is fewer BTU's lost per KWH.

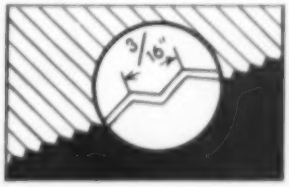
With Childers Jacketing, older power plants, as well as new, take on a trim, modern appearance. Unlike ordinary sheet aluminum, Childers Jacketing has a 3/16" cross corrugation rolled in it. This cross-crimping reduces glare, makes dirt less visible. Housekeeping is easier — your plant is always a credit to the community.

Write: Childers Manufacturing Co., Dept. SPI-10, 3620 West 11th St., Houston 8, Texas.

LAP SEAL, available at no extra cost, is a series of 8 ribs rolled into the underlapping edge of the jacketing, providing an automatic measure of the 2" circumferential lap. Proper lap is insured without waste. Labor is saved. Where desired, a positive weather seal is easily made with Lap Seal and a mastic.



FACTORY-ATTACHED MOISTURE BARRIER protects the underside of aluminum from possible attack by alkaline solutions present in most insulating materials. The moisture barrier, bonded at the factory by continuous strip adhesive, adds little to cost, saves application labor, insures against underneath corrosion.



TESTS PROVE EXTRA STRENGTH of rolled-in 3/16" cross corrugation. Vertical strength and rigidity of a .016" sheet with this 3/16" cross corrugation are increased to that of a plain .024" sheet. Jacketing costs are consequently reduced by as much as 1/3 when Childers Jacketing is used instead of ordinary sheet aluminum.

CHILDERS HEAVY WEIGHT ALUMINUM JACKETING is recommended for extra protection of lines along walkways and other areas subject to physical abuse. Also recommended for protection of insulated towers, vessels and tanks. Only Childers offers .019" Heavy Weight jacketing in labor-saving 4' wide rolls.

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A CATALOG
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Truly, in both size and type, there is a Kerrigan Weldforged grating for every need. Let our new catalogs prove it to you. Send for the one you think best answers your need (or ask for ALL FOUR if you wish). We will also be glad to send you a desk-size grating sample.
Write Kerrigan Iron Works, Inc., 1017 Herman Street, Nashville 2, Tennessee.

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for the 1001 applications where safety and strength come first. Kerrigan Steel Grating is BONDERIZED for corrosion resistance and extra years of life.

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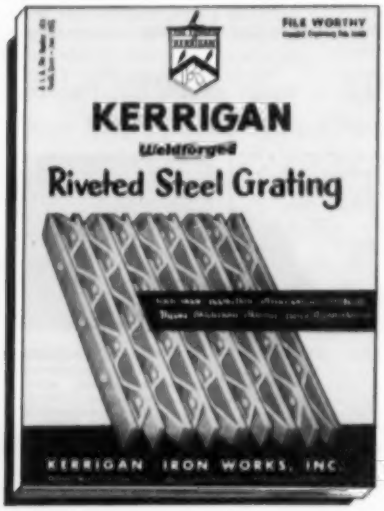
non-magnetic steel for the chemical, oil and packing industries . . . for ANY installation where high resistance to heat, acids, chemicals, and corrosion is needed.

ALUMINUM
spark-proof for those whose need is strength AND lightness. Extra safe and strong. Allowable fiber stress 15,000 psi. Modulus of elasticity 10,000,000 psi.



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SOUTHERN POWER AND INDUSTRY

Vol. 75
No. 5

MAY, 1957

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Annual Subscription—$1.50
Foreign—$10.00

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Published monthly by
W. R. C. SMITH PUBLISHING CO.
Atlanta, Ga., and Charlotte, N. C.

Publishers also of *Textile Industries*, *Electrical South*, *Southern Hardware*, *Southern Automotive Journal*, and *Southern Building Supplies*.

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Contents indexed regularly by Engineering Index, Inc.

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Editorial and Executive Offices: SOUTHERN POWER & INDUSTRY, 806 PEACHTREE ST., N. E. ATLANTA 8, GA.

Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

May, 1957

◆ PUT-PUT WEAVING—American Viscose is offering licenses for use of a new patented propellant for loom shuttles. A small gasoline cylinder is located at each side of the loom and the shuttle furnishes the compression cycle and actuates the spark for exploding the gas.

The new shuttle drive is expected to eliminate about 35 moving parts on present looms, reduce vibration and increase greatly the speed of the loom. It will also be possible to weave wider fabrics than with conventional picker stick drives.

The powered shuttle can be incorporated in new looms or in existing looms of which there are about 500,000 in use today. What next?—Perhaps just a little atom cracker on each side of the loom.

◆ STICKING YOUR NECK OUT—The Cambridge Wire Cloth Co. is running a chance of getting a lot of unwarranted complaints on their good gripper woven wire slings, and having to pack and ship a lot of mollusks.

They say: "Buy one of our Gripper slings and try it for one month. If you still feel that some other type of sling is easier, faster and safer to use, just tell us and we'll see that you get one gallon of freshly shucked, succulent salt water oysters from the famous Chesapeake Bay country."

All fishermen are truthful, but how about sling using oyster eaters!

◆ MAINTENANCE LABOR COSTS actually exceed the cost of production labor in many plants. At Du Pont's 1,000-acre Sabine River Works in Texas, 23% more maintenance men are employed than production men. Few companies have this high a ratio, but month by month, plant maintenance costs are creeping up in virtually every plant.

The same high labor costs that forced management to take production out of the workers' hands and put it into automatic processing are coming back to plague industry once again. But this time, it's not the cost of making the product by hand—it's the cost of maintaining the equipment by hand. The only solution in sight is one that's being heard again and again—buy the best equipment on the market.

◆ YOU MAY THINK OF GLASS as a laboratory item—and it is. But the plants that handle chemicals in a big way have known for years that it is also highly reliable production equipment where the materials handled are especially corrosive to metals.

Brine feeder lines and spent brine lines connected to North Carolina's Ecusta Paper Division's Sorenson-type chlorine cells are of Pyrex brand glass pipe. After nearly a decade of use, lines show no corrosive damage.

For you

CLARAGE FAN COMPANY
619 Porter St., Kalamazoo, Michigan

Please send me literature on:

- ☐ Type NH fans for ventilating, air conditioning, and industrial services
- ☐ Type XL fans for industrial air and material handling
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SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

Facts and trends *(continued from page 4)*

◆ INCREASING COMPLEXITY of modern processing and equipment has placed an ever increasing responsibility on the maintenance forces. As a result, every maintenance head has seen maintenance costs increase steadily.

The cost for maintaining this country's industrial facilities increased 9% in 1956 and it is expected to increase by at least another 10% this year.

In this issue O. S. York, manager, maintenance engineering section of E. I. du Pont & Co. discusses "Changing Requirements for Maintenance." On page 43 he shows how changing employment patterns are increasing the magnitude of the maintenance problem. Other factors continually changing the pattern include advancing technology in instruments and controls, new materials and methods, and the increasing difficulty of maintaining the operation of the mechanical plants.

◆ ELECTRICAL DISTRIBUTION EQUIPMENT requires planned maintenance. Outage on one of the least significant feeders can disrupt the entire process operation. On page 70 Henry Heddesheimer, Electrical Consultant, Plant Engineering & Maintenance Services of G-E, discusses some of the inspections and preventive maintenance techniques that you can utilize to reduce to a minimum the number of failures in your distribution system.

"Continuous Kilowatts" covers capacitors, high-voltage bushings, cable, transformers, and relays. If you do not have the trained personnel or equipment required to make recommended checks, enlist the aid of the nearest service shop or the utility company supplying your power. Quite often the utility will perform some of these services at no charge. However, if a charge is made, it is money well spent.

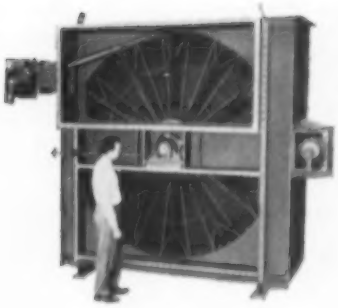
◆ BETTER MAINTENANCE BUYING—Let the salesmen help and use vendors' services. On page 46 Bob Fulgum of Atlanta's R. L. Fulgum Co. gives ten rules that will decrease the burden on plant and maintenance engineers and save money for their companies.

Good maintenance almost automatically implies a mutually helpful relationship between buyer and seller. Both must think in terms of cost per year rather than initial cost alone.

On page 47 Norman C. Stiles, Director of Purchases for The Chemstrand Corporation shows how you can bring about true profits by reducing your company's cost of doing business. You can profit in many ways by utilizing vendors' services.

◆ GOOD OLD ALABAMA CLAY—Natco Corporation, the country's largest manufacturer of structural clay products, will build a $2 million plant near Bessemer, Alabama, in an area where the company has been mining clay for 27 years. The highly mechanized plant will manufacture conduit for telephone, light and power lines.

Write the editors for additional information on any of the above items. SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 8, Ga.



HOW MANY STACK BTUs DO YOU BUY EACH YEAR?

Whether you burn it — or dissipate it up the stack — every BTU costs you money. In fact:

Yearly cost of fuel often equals the cost of your boiler. That's why heat recovery — or dollar recovery — is so important. Boilers simply have huge appetites for fuel . . . fuel that's constantly going up and up in cost.

And small boilers are no exception. Even with relatively small boilers — that is, between 25,000 and 250,000 lbs per hr — substantial heat recovery is possible. With a Package Ljungstrom Air Preheater, fuel consumption is most often reduced 10% or more! As a result, many plants have written off their Ljungstrom within two years.

Get more steam, and cleaner stack gases. Put it another way. The BTUs that you save with a Package Ljungstrom can be used to increase boiler output. What's more, higher combustion temperatures cut slagging . . . keep stack gases clean . . . allow use of cheaper fuels . . . reduce corrosion.

Comes complete, ready to install. Determine for yourself how easily a low-cost, *shop-assembled* Package Ljungstrom can be applied to your generating or process system. Ask for our brand-new 16-page brochure. It's yours with our compliments, simply by writing to the address below.

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

Equipment . . . Supplies . . . Methods

FOR FREE INFORMATION — Circle Code Number on Page 121 Return Card

Heat Transfer Medium

E-1 Thermon, a non-metallic plastic compound with highly efficient heat transfer properties, is available from **Thermon Manufacturing Co.**, 1017 Rosine St., Houston, Tex.

It is applied in a viscous paste form over either conventional steam traced or thermal electric systems, working equally well for heating or cooling systems. When cured to cement-like hardness, it bonds itself to the coils and equipment to form an unbroken thermal connection. It utilizes the entire surface of the tracer tubing and conducts this heat to the surface to be heated, or away from the surface to be cooled.

Thermon has been tested in laboratory kilns in temperatures up to 1700 F and is currently being used in systems up to 750 F in alternate hot and cold service without any signs of cracking, spalling, degradation, or other ill effects. In addition to its heat transfer properties, it has excellent mechanical and thermal shock resistance with linear shrinkage of less than one percent

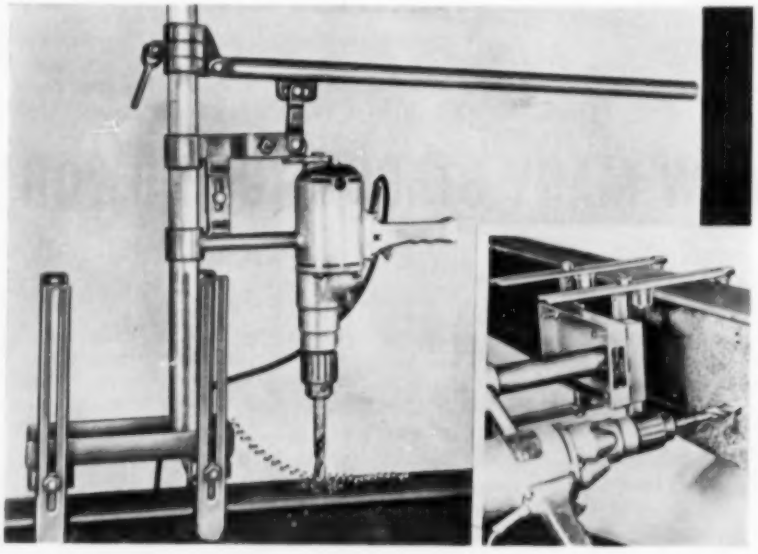
Thermon may be used wherever expensive steam jacketing systems are ordinarily employed and in numerous cases where steam jacketing is impossible, with a savings of up to 75%. It may be applied to new or existing equipment.

Portable Radial Drill

E-2 **Lance Iron Works,** Box 310R3, Chicago Heights, Illinois, announces a new Portable Radial Drill Press for drilling "anything, anywhere." It eliminates the necessity for handling large pieces, for bringing heavy, unwieldy tools to the job or for turning the work to be drilled, countersunk or tapped.

The drill is ideally suited for steel erection, all types of construction and general maintenance. It is designed so that it cannot fall off a work piece under any circumstances.

It is portable, of all-steel construction, easily carried, operated and controlled by one man, swings in a 360 degree radius, is adjustable horizontally or vertically and clamps and rolls on any size, shape or type of metal or wood with a safe, sure grip. It is designed for all standard, heavy-duty portable drills, can be used with electric or air-operated drills, operates in all positions



—vertical, horizontal, overhead or flat.

Literature is available from the manufacturer.

ROBVON BACKING RINGS

Patent Nos.
Type C Reg. Pat. No. 2366579
Type CC & CCC Reg. Pat. No. 2764426

APPROVED BACKING RINGS FOR WELDED PIPE, VALVES, AND FITTING JOINTS

AVAILABLE IN CARBON STEEL, WROUGHT IRON, CHROME ALLOYS, STAINLESS STEEL, ALUMINUM AND COPPER.

TYPE CCC Designed for quick easy alignment of pipe where the variation in inside diameters is relatively great. Chamfered NUBS allow close tolerance fit-up and CLEAN STRIKE OFF. The ROBVON NUB conforms to the diameter of weld rod. ROBVON rings are beveled to assure non-restricted fluid flow.

TYPE CC Designed to allow quick easy alignment of pipe where the inside diameters are slightly out of round. The welder has the choice of "STRIKING OFF" the NUBS or leaving them intact to be melted into the weld mass of the first root pass.

TYPE C Designed for precise close tolerance fit-up. Type "C" NUBS conform to the diameter of the weld root. The NUBS melt with the metal to give complete penetration and fusion.

ROBVON ALSO MANUFACTURES MACHINED RINGS TO CUSTOMERS SPECIFICATIONS.

ALL FABRICATED SOLID MACHINED RINGS X-RAYED

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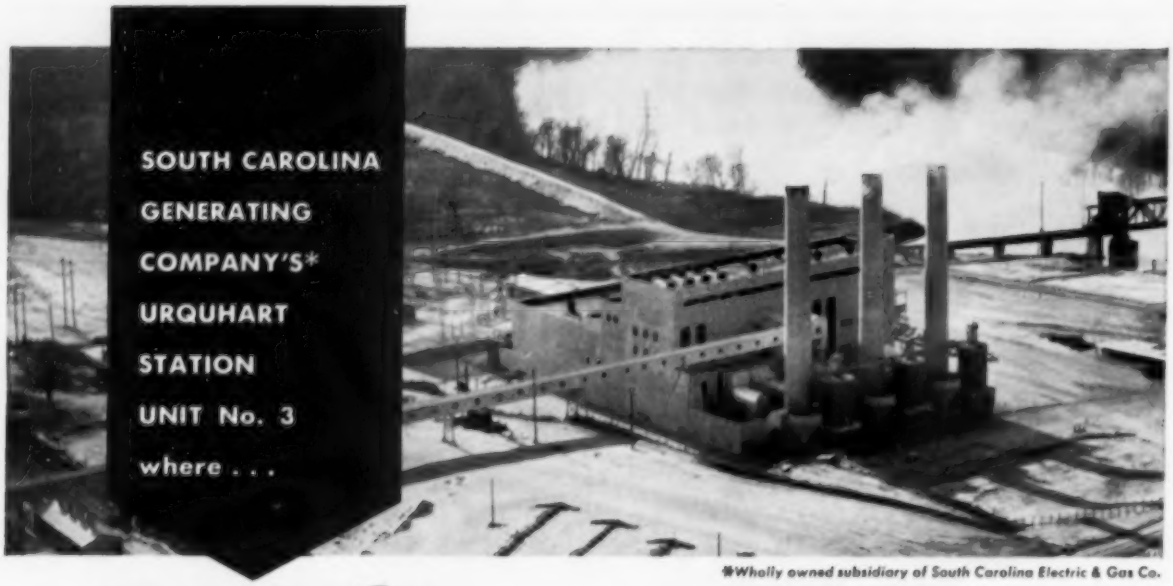


*Wholly owned subsidiary of South Carolina Electric & Gas Co.

REPUBLIC *Automatic* COMBUSTION CONTROLS *Anticipate* FUEL-AIR-WATER REQUIREMENTS!

● Adjusts fuel, air and water as steam flow changes ● Makes follow-up adjustment of header pressure and water level if needed ● Prevents (rather than corrects) most pressure, level and temperature fluctuations before they happen!

Planned expansion of power in the Southeastern United States is typified by the addition of Unit #3 to South Carolina Generating Co.'s Urquhart Station. Rated capacity of the steam generator is 700,000 lb/hr at 1825 psi, superheated to 1010 F and reheated to 1010 F. Designed by Gilbert Associates, Urquhart #3 is modern in performance as well as appearance.

REPUBLIC's "Electronic Master" combustion control and triple-element feedwater control permit firing of pulverized coal, natural gas, or both at once without fluctuation of header pressure or water level. This system starts adjusting fuel, air and water as soon as steam flow changes perceptibly, not waiting for either drum level or header pressure to change.

If either of these factors change despite the preliminary adjustment, the change will be very small and will be offset immediately by a follow-up control that modulates the existing control signal. Since the flow of flue gas is held in such close proportion to the steam flow, temperature at the superheater outlet is held very close to a constant 1010 F despite load swings.

This advanced control system is a logical partner to the advanced thinking apparent throughout Urquhart #3. The quick action of electronic control added to the traditional reliability and power of pneumatic actuation produces a stable, accurate, dependable automatic system. And any one or all of the automatic control functions can be cut out at will to permit substitution of remote manual control at any time. Manual controls include indicators for electronic loadings of the regulators and positioners as well as position and rate of response indicators.

Control room of Urquhart Station's modern Unit #3.

NEED HELP on "Early Stage" Planning?

Remember that Republic, too, is planning ahead. To get the latest information on developments that will effect control in your future power or processing plant, contact the REPUBLIC Engineering Department as soon as such help would be beneficial.

REPUBLIC FLOW METERS COMPANY

2240 Diversey Parkway, Chicago 47, Illinois

ALGAE CONTROLLED IN 20-MILE CANAL with PHYGON-XL

In a large canal in California*, delivering 28,800 gallons of water per minute, filamentous algae is controlled by a water suspension of Phygon®-XL. On the 11th day following treatment, for example, the first 10 miles of the canal were clear of algae, while the remaining 10 miles had only short algae. Phygon keeps the upper hand at all times.

In all parts of the country, you will find that Phygon-XL has been determined by usage and test to be the least expensive, *most* effective algicide for lakes, ponds, reservoirs and industrial water recirculating systems. Harmless to humans and mammals.

Order Phygon-XL from your local supplier today. Write, wire or phone us if unable to locate immediate source of supply.

*From our correspondence files

United States Rubber

Naugatuck Chemical Division

Naugatuck, Connecticut

producers of seed protectants, fungicides, miticides, insecticides, growth retardants, herbicides: Spergon, Phygon, Aramite, Synklor, MH, Alanap, Duraset.

Equipment, Supplies & Methods (Continued)

Wrench "Booster"

E-3 The Model TD Wrench Booster, a new general-utility tool which boosts wrench turning force four times, is announced by the **X-4 Corporation** of Acton, Massachusetts. Used with standard sockets and wrenches, this wrench accessory provides a four-to-one mechanical advantage for safe, easy loosening and tightening of heavy threaded parts.

The heart of the "booster" is a set of planetary gears, built into a simple concentric tool head. It can be completely dismantled in seconds for occasional cleaning or lubrication, and is built for torques up to 2,000 foot-pounds. X-4 Models TD 750 and TD 1000 are designed for socket-drives of ¾-inch and 1-in. respectively.

The compact X-4 tool can be conveniently used in the field, the shop, or the plant, without need for accessory power. It is ideal for close-quarter work.

Conoflow Series LB Control Valve with Electro-Pneumatic Positioner.

Valve Positioner

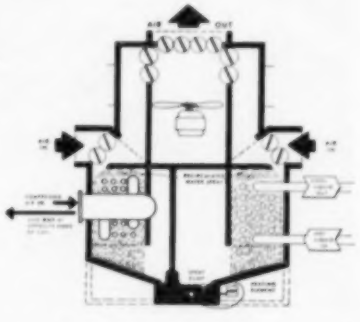
E-4 A new electro-pneumatic positioner is now available from **Conoflow Corp.**, 2100 Arch St., Philadelphia 3, Pa., as an integral component of Conoflow Series LB Control Valves—a complete line of pneumatic Cylinder Conomotor actuated valves with single-seated, split valve bodies.

The Model "E" Electro-Pneumatic Positioner provides valve positioning which is directly proportional to DC signals received from electronic instruments. No electro-pneumatic transducer is required; full 100 psi plant air supply can be used. The electro-pneumatic positioner possesses all of the rigid operating characteristics of the LB valve's standard pneumatic positioner, insofar as sensitivity and stability are concerned, and eliminates the inherent transmission lag of all-pneumatic systems.

After Cooler Design

E-5 **Niagara Blower Company**, 405 Lexington Ave., New York 17, N. Y., announces a new and more economical design Aero After Cooler of large capacity offering a self-contained method of cooling and removing the moisture from compressed air, independent of a large supply of cooling water and replacing both shell and tube cooler and cooling tower. It also combines in one machine provision for cooling compressed air and also for cooling water in a closed system for intercooler and compressor jackets.

The apparatus consists of two parallel mounted cooling coils (one for jacket water and one for compressed air) in separate casings joined to a central plenum. Sprays of recirculated water constantly drench these coils. Evaporation transfers the heat of compression, at the rate of about 1000 Btu per pound of water evaporated, to the air stream. The air enters above the coils, travels down thru them and moves into the central plenum dropping its entrained moisture, then turns upward and is ejected by a propeller fan.

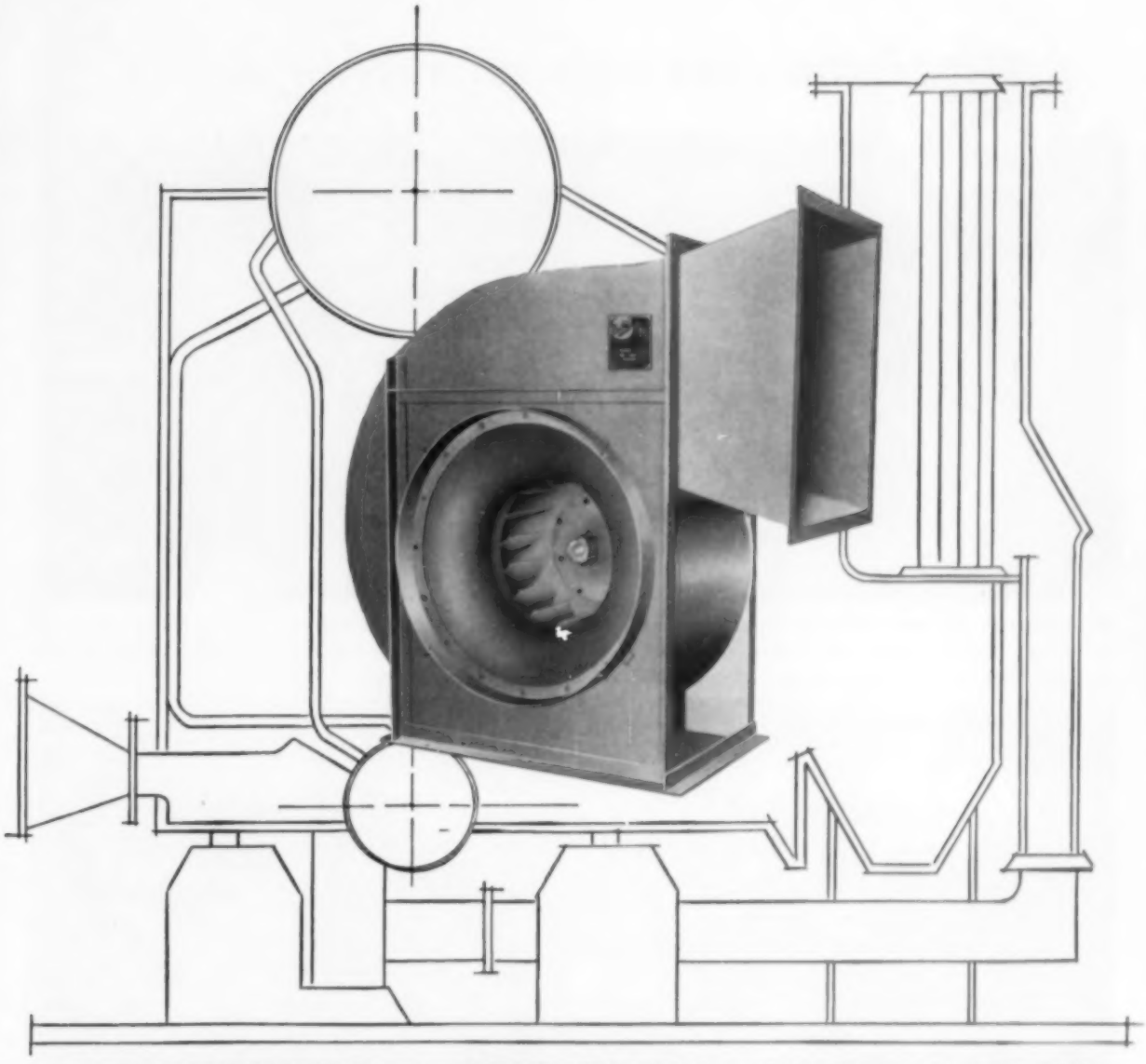


The new unit is especially fitted for large plant compressed air services, assuring dry air for the trustworthy operation of automatic machines and power applications, paint spray, sand blast and special processes such as air liquification systems. It results in the saving of 95% of cooling water—and much trouble and expensive moisture damage to compressed air systems and tools.

There are four sizes in this model with capacities up to 23,000 cfm of free air cooled from 275 F to 85 F at 75° wet bulb atmospheric air.

For More Free Data CIRCLE CODE NO. on the Handy Return Card — Page 121

(*Continued on Page* 98)



FOR ECONOMICAL MECHANICAL DRAFT SERVICE

"BUFFALO" TYPE "CR" RADIAL WHEEL DRAFT FANS

Combining sharply rising pressure and horsepower characteristics with high static efficiency and resistance to abrasive effects, the "CR" is an ideal fan for stoker-fired or pulverized coal boilers. It is also proving an excellent choice for handling air with dust loadings in a wide range of industrial jobs. Too, these same high-pressure, high-capacity characteristics may mean a smaller fan for many direct-connected applications — a saving in first cost.

Write for Bulletin FD 205 and see the dependable, stable performance built into this husky radial wheel fan for constant volume or inlet-dampered operation. It's one of a *series* of specialized "Buffalo" Draft Fans — including airfoil and backward curve designs with a wide choice of wheels — to give you the best service your operation requires.

NOTE: *Every "Buffalo" Fan has the exclusive "Q" Factor—the built-in Quality which provides trouble-free satisfaction and long life.*

BUFFALO FORGE COMPANY

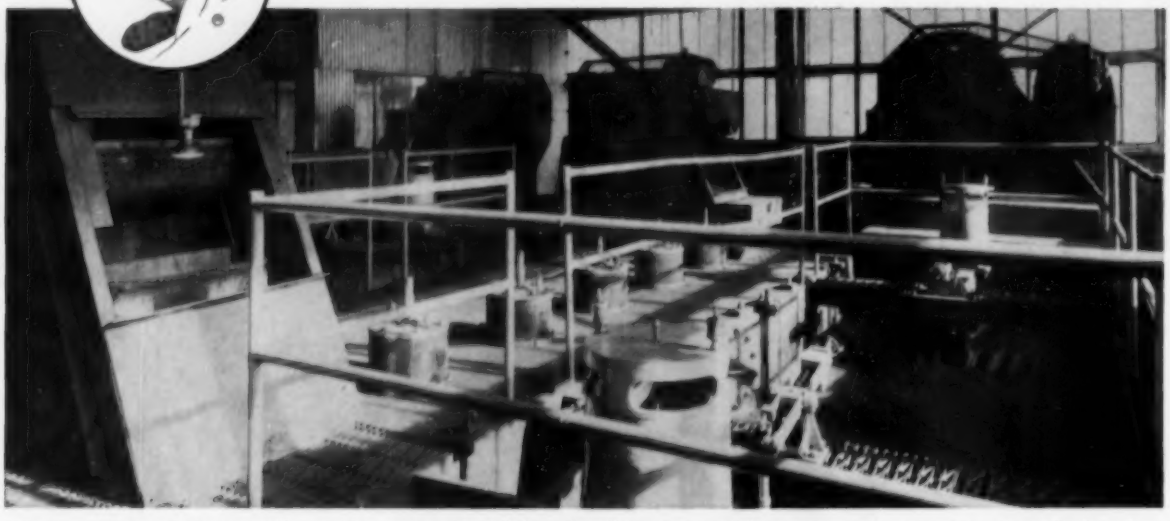
BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

WHY CHESSIE'S RAILWAY IS FIRST IN COAL



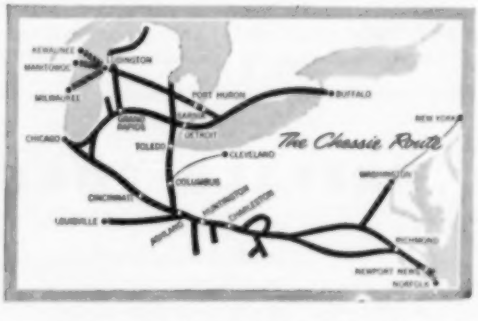
SUPERIOR COAL. The entire output of this mine is processed by automatic compound coal cleaning equipment. Producers on the Chesapeake and Ohio are prepared to supply you with highest quality coal of the type best suited to your needs and processed to your own specifications.

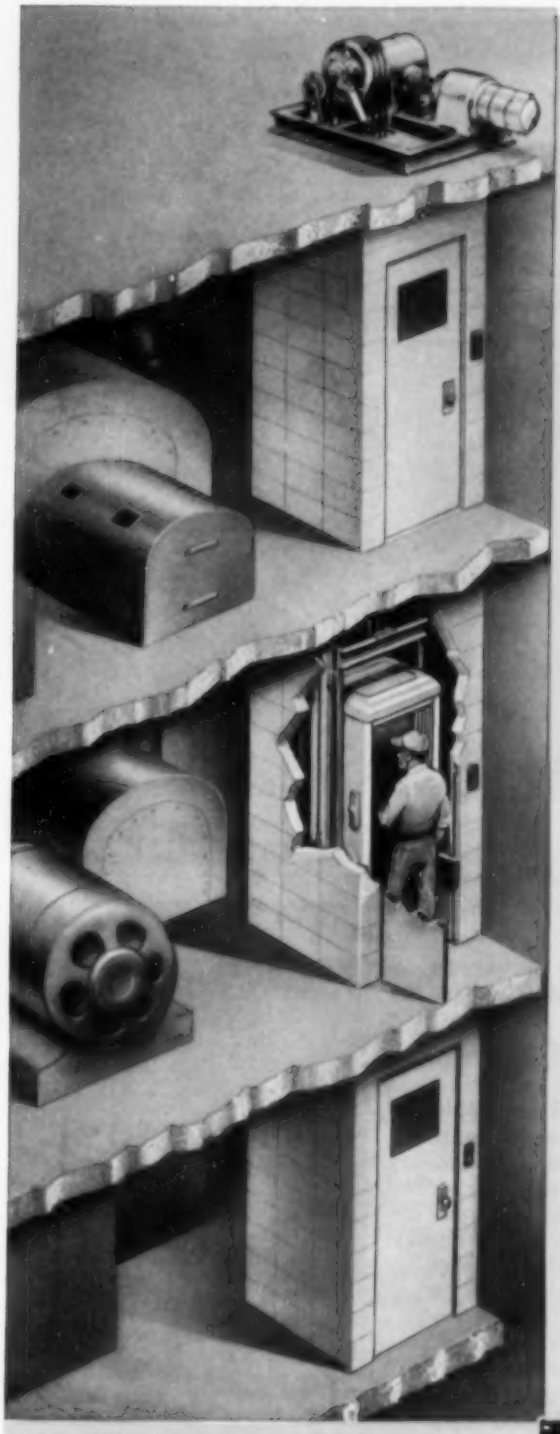
SUPERIOR SERVICE. To its present fleet of 63,780 coal cars—largest in the world—C & O is adding another 8,000. New high-speed yards, new locomotives and a new teletype car reporting system bring you faster, more dependable service.

For dependable deliveries of top quality coals, contact coal producers on the C & O. And for specific help in meeting your own fuel requirements, write to: R. C. Riedinger, General Coal Traffic Manager, Chesapeake and Ohio Railway Co., Terminal Tower, Cleveland 1, Ohio.

Chesapeake and Ohio Railway

WORLD'S LARGEST CARRIER OF BITUMINOUS COAL





speed production eliminate fatigue increase safety

EHRSAM ELECTRIC ELEVATORS AND BELT MANLIFTS

This rapid, safe transportation between levels for employees pays big dividends in increased efficiency of plant operations. It keeps working spirits high and conserves man-energy. Such inter-floor transportation is economical for any plant with two or more stories.

Ehrsam Electric Elevators and Belt Manlifts are factory-assembled and pretested. Standard speed of Electric Elevators is 90 ft./min.; for special applications speeds of from 50 - 120 ft./min., are available. Standard speed of Belt Manlifts is 75 ft./min.; for special applications speeds of from 50 - 80 ft./min., are available.

ELECTRIC ELEVATORS
Push button car-type electric elevators for one to four passengers.

BELT MANLIFTS
Step-on-type vertical endless belt manlifts for simultaneous traffic in both directions.

Ehrsam Elevators and Belt Manlifts conform to the requirements of the American Standard Safety codes, all local and state codes.

Start your business on the way "UP" with an Ehrsam Elevator or Manlift!

Dept. SP

WRITE or WIRE TODAY for illustrated brochure showing typical installations and specifications.

SALES OFFICES: Denver, Colorado; Fort Worth, Texas; Kansas City, Kansas

WEST COAST: Ehrsam Pacific, Inc., Riverside, California

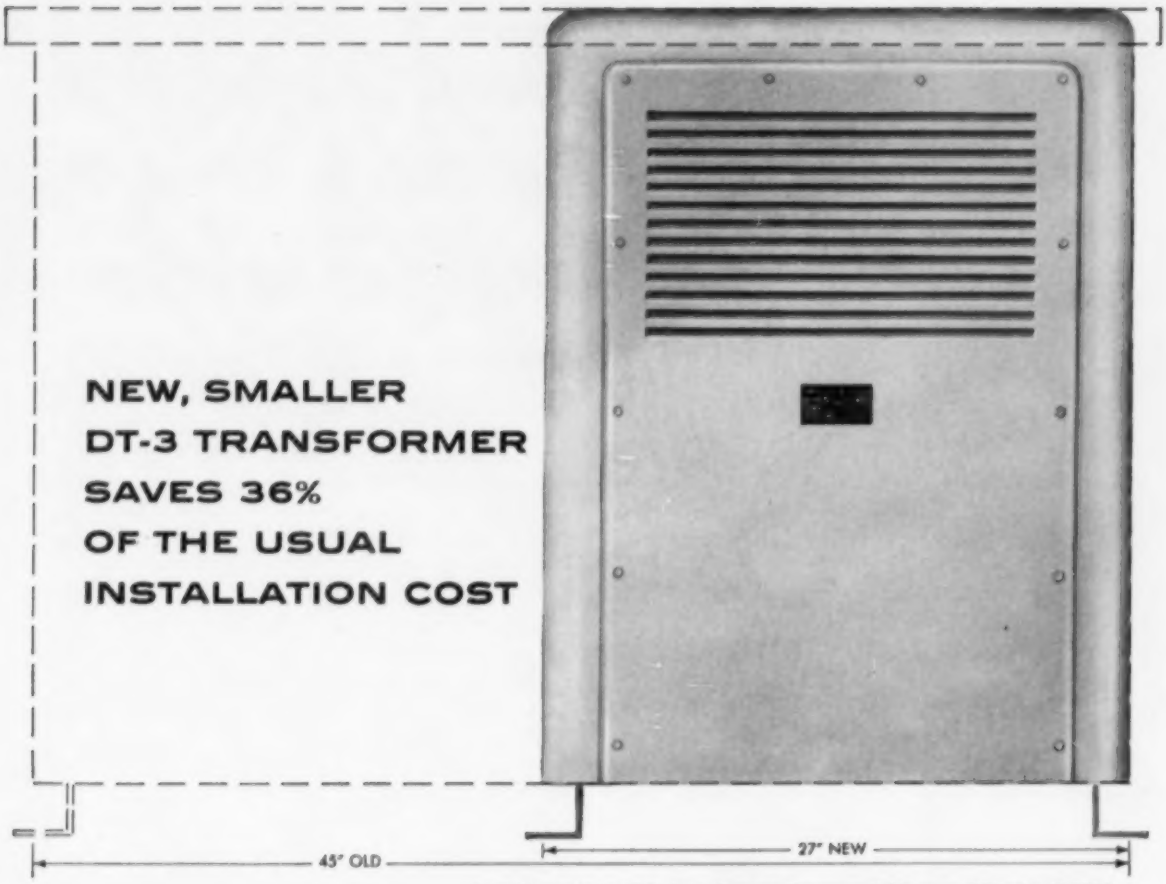
EHRSAM®

THE J. B. EHRSAM & SONS MFG. CO.

ENTERPRISE, KANSAS

Over 80 Years of Dependable Service

NEW, SMALLER DT-3 TRANSFORMER SAVES 36% OF THE USUAL INSTALLATION COST



New Westinghouse DT-3, three-phase transformer available up to 4800 volts, 45-300 kva.

The new DT-3, 3-phase dry-type transformer is the biggest stride in many years in bringing you moneysaving installations. Here's why:

1. *25-51% smaller than Class B, 80° 3-phase transformers.*
2. *New core and coil design slashes weight 17-32%.*
3. *Noise levels average 12-13 decibels below NEMA Standards.*

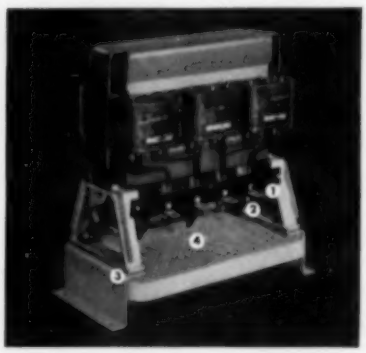
These smaller, lighter, quieter transformers are easier to handle, can be mounted quicker, and fit more easily into convenient, close-to-load points. Installation cost is only ⅓ that of three single-phase units; completely interconnected and tested at the factory—just mount and connect leads. The official NECA *Manual of Labor Units* shows 14 hours of labor saved when installing one 3-phase, 45-kva transformer as against three single-phase units. Westinghouse DT-3 transformer weight advantage further increases this saving.

The new DT-3 transformer is designed with Group III insulation—exclusive Westinghouse Silclad—for 150° C rise; nonorganic silicone base. *CASE TEMPERATURES ARE LOWER THAN UNDERWRITERS' STANDARDS.*

Call your Westinghouse sales engineer, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70770

YOU CAN BE SURE...IF IT'S

Westinghouse



1. Easily accessible terminals. 2. Tap changer. 3. Core and coil float on exclusive, isolating vibration dampers. 4. Large terminal compartment at bottom where air is at cool ambient temperature—high-temperature cables not required.

COMPARE WEIGHT SAVINGS RESULTING FROM USE OF HIPERSIL® CORE STEEL

kva	(W)	Mfg-A	B	C	D	E	F
45	521	580	920	815	957	580	870
75	657	820	1275	1145	1500	915	1475
112½	876	1175	1710	1600	2070	1325	1950
150	1042	1500	2300	2060	2400	1600	2400
225	1480	2630	3000	3150	3150	—	3475
300	1718	3100	3900	4300	3800	—	4100

New Revolutionary Steam Trap

One large capacity seat for all pressures!

New Sarco Thermodynamic steam trap. Sizes ⅜ to 1"... each body as small as a tee fitting! Capacity is determined, not by a bulky body, but by the effective orifice, valve action, pressure drop and condensate temperature.

1. Cuts trap inventory

With the revolutionary Sarco TD steam trap, you use exactly the same trap... with exactly the same large capacity seat... for all pressures 10-600 psi... for heavy, light or no condensate load. Sizes ⅜ to 1".

2. All pressures 10 to even 600 psi!

...without changes or adjustments. Self-adjusting. High pressure construction... at a low pressure trap price!

3. Operates perfectly when pressure fluctuates

Absolutely no effect even from 600 to 10 psi! No water seal to evaporate. No adjustments.

4. Widest capacity range

Same large capacity seat for 10 as for 600 psi. Pressures of incoming air and condensate INSTANTLY AND FULLY raises valve head (disc), permitting maximum discharge.

5. Operates equally well on all loads

The same Sarco TD trap for heavy, light or no condensate load. No prime to lose. No adjustments.

6. No oversizing worries

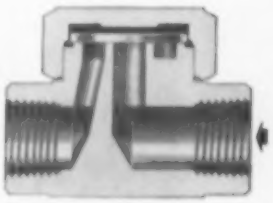
You can size the new Sarco TD steam trap for peak condensate loads... without risk of blowing steam on light loads... no prime to lose... no adjustments.

7. No steam leak required

...to operate the revolutionary Sarco TD steam trap (Pat. Pending). Closes tight against steam!

Convince yourself by 60-day trial... use coupon

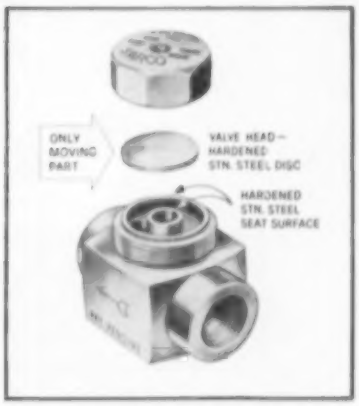
SARCO



Trouble-free design

Here is a trap so simple, it doesn't even have a valve closing mechanism. The kinetic energy of steam closes the valve. ONLY the new Sarco TD uses this operating principle.

No mechanism parts to wear or stick. No narrow channels to choke. No gaskets to leak.



Maintenance practically eliminated

The all-stainless steel Sarco TD has only 3 parts... cap, disc and body. Only moving part is a hardened SOLID stainless steel disc, practically wear-proof.

SARCO COMPANY, INC.
Empire State Bldg., N. Y. 1, N. Y.

Please send me Sarco TD Steam Trap and strainer for 60-day trial. Size_____ For use on_____

Name_____

Firm_____

Address_____

City_____ State_____

X101-B

This Bailey Meter Control System is —

Saving Fuel at Appliance Park

★ General Electric Company at its Appliance Park Boiler House, Louisville, Ky. has found that Bailey Controls help to save fuel by continuously maintaining desired operating conditions.

With a Bailey-engineered control system you can count on a high output of available energy per unit of fuel.

Here's why:

1. Suitable Equipment

When you receive equipment recommendations from a Bailey Engineer his selections come from a complete line of well-engineered and carefully tested products.

2. Seasoned Engineering Experience

Your local Bailey Engineer brings you seasoned engineering experience based on thousands of successful installations involving problems in measurement, combustion, and automatic control.

3. Direct Sales-Service—close to you

For your convenience and to save time and travel expense there's a Bailey District Office or Resident Engineer in or close to your industrial community.

For greater fuel savings, less outage and safer working conditions, you owe it to yourself to investigate Bailey Controls. Ask a Bailey Engineer to arrange a visit to a nearby Bailey installation. We're glad to stand on our record.

A128-1

FORMULA
for Cutting Steam Costs

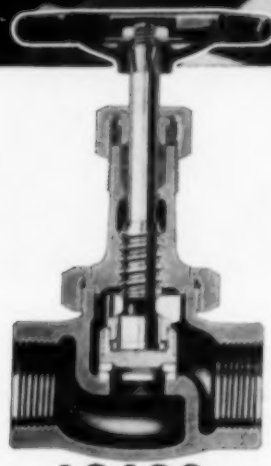
\+ Bailey Design
\+ Bailey Engineering
\+ Bailey Service

= Greater Savings per Fuel Dollar

BAILEY
METER COMPANY
1028 IVANHOE ROAD
CLEVELAND 10, OHIO
Complete Controls for Steam Plants

BAILEY METERS
Controls for
COMBUSTION
FEED WATER
TEMPERATURE
PRESSURE
LIQUID LEVEL
FEED PUMPS

IT'S TIME TO CUT *Maintenance* COSTS



LQ600

Backed by cost-cutting Distributor service . . . you can't beat the exclusive LQ600 for cost reduction. Its patented Brinalloy® seats and discs outwear even 500-Brinell or 1000-Brinell case-hardened stainless.

At no time in history have industrial valve maintenance costs been so high. Labor costs are skyrocketing. Add in your maintenance department overhead and the production time lost because of valve breakdowns, and your total maintenance cost figure is pretty close to the danger mark. The price of an ordinary valve is actually dwarfed by the cost of keeping it in operation. That's why it always pays to install *the best valves you can buy.* For nearly a hundred years, they've been made by The Lunkenheimer Company, Cincinnati 14, Ohio.

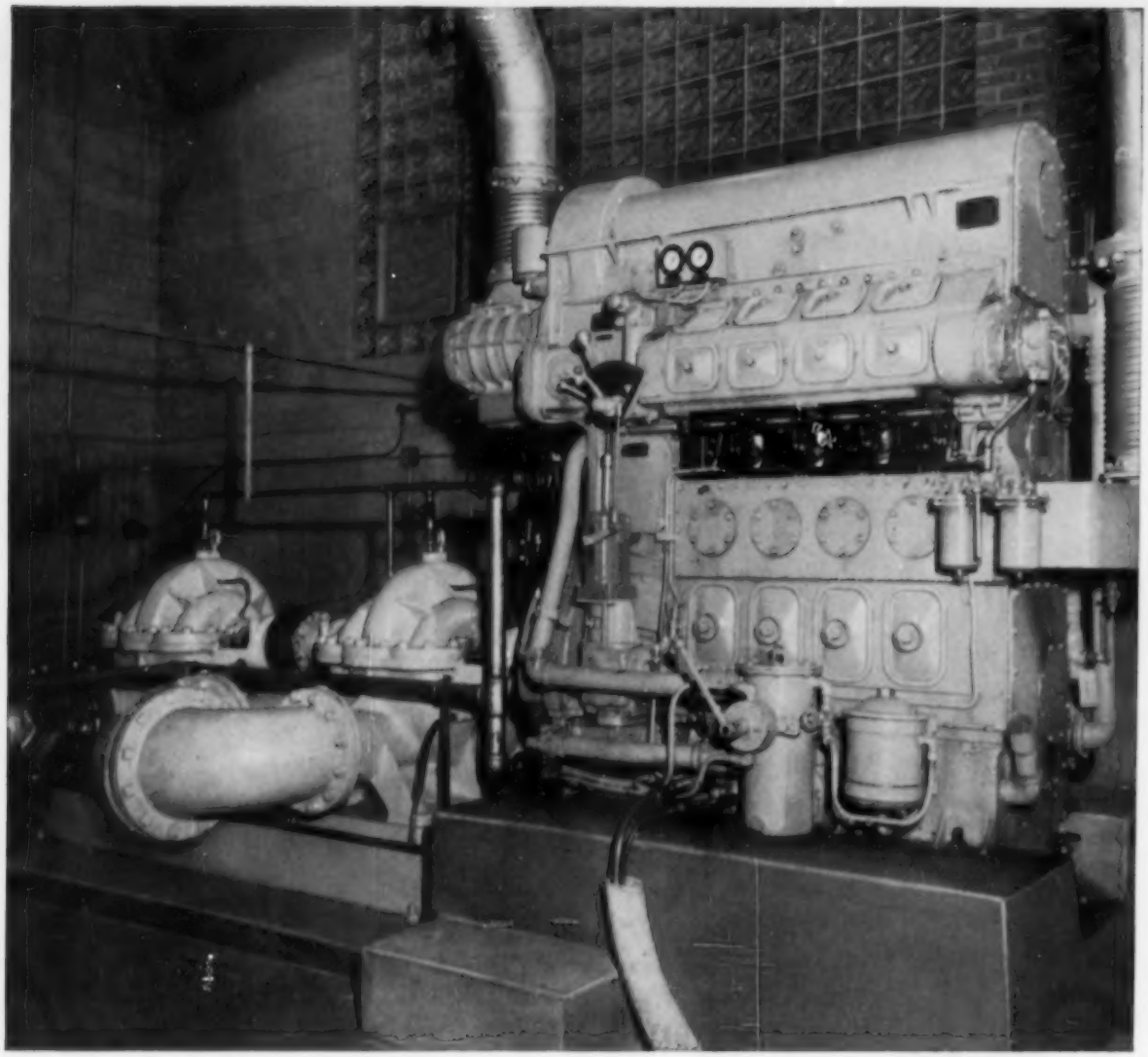
The cost of a LUNKENHEIMER VALVE
Gets smaller . . . and smaller . . . and smaller
with each passing year of dependable service.

BRONZE • IRON • STEEL • PVC

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

L-557-10



FAIRBANKS-MORSE TEAM

Cuts Pumping Costs in Half

Power costs at Canandaigua, New York, were running $24.68 for a million gallons of water pumped. Then a Fairbanks-Morse team of 300 horsepower Opposed-Piston diesel and two 10″ centrifugal pumps took over and made a power savings of 51%.

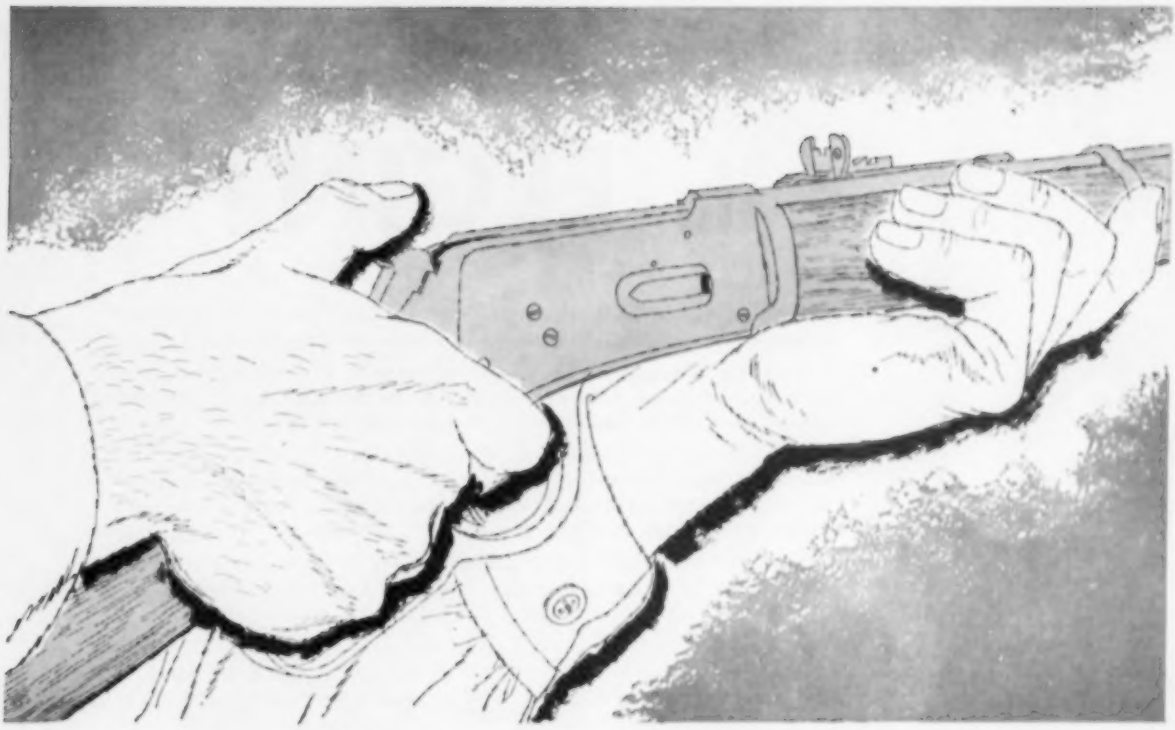
Originally installed as a standby unit, the Opposed-Piston diesel engine produced such obvious economies that it soon was scheduled for a major part of plant pumping—providing power to pump as high as two million gallons a day in the summer. The 10″ centrifugals operate in series and, though designed for 2500 g.p.m., they consistently average 2800 g.p.m. at a net head of 304′.

F-M engineering that matches power and pump can bring economy and increased efficiency to your specific pumping problem. Write for details on the type and size of pump you need—there are more than 50,000 models in the F-M pump line. And there's a "working model" of the Opposed-Piston engine contained in Bulletin No. AOX-350.15, waiting for your request. Fairbanks, Morse & Co., Dept. SPI-5. Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIPSEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS



How not to go off half-cocked!

You are planning a paper mill installation. You've taken into consideration all the conditions your pipe and tubing must meet, and now you're ready to choose a steel analysis that you think will do the job efficiently and economically. But, wait—before you make your decision, there's one thing more you can, *and should*, do.

Call or write National Tube. Explain the situation and request the services of our technically trained Mill Service Force. A competent technician is available at your request. He will go over your installation specifications with you and will recommend a tubing analysis. You may be surprised to find it's not the same analysis you chose—and perhaps pleasantly surprised to learn it will cost you less money than you had figured.

So don't buy without first making this double check. One phone call or a post card to us might save you hundreds of dollars. And our help won't cost you a cent.

National Tube manufactures seamless pipe and tubes in a complete range of steel analyses from low carbon through the alloys up to and including stainless steels. A wide range of sizes and wall thicknesses is available for every mechanical and pressure purpose.

See The United States Steel Hour. Televised alternate weeks. Consult your local newspaper for time and station.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS NATIONAL SEAMLESS PIPE AND TUBES

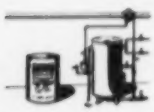
UNITED STATES STEEL

They have placed their trust in ELGIN!

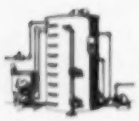
ZEOLITE WATER SOFTENER — manual and automatic. Up to 44% more soft water output from a softener of given size.

ULTRA-DEIONIZERS — produce highest quality mineral-free water. Replace distillation methods at fraction of distillation cost.

DEALKALIZATION & ION EXCHANGE SYSTEMS—Dealkalizers to control alkalinity. Ion Exchangers to produce water of any desired quality.



CHEMICAL TREATMENT SYSTEMS—prevent scale, corrosion and depositions with Elgin specially formulated chemicals.



CLARIFIER—for removing excess alkalinity and solids for clarification of turbid waters.

DEGASITORS—for removal of entrained gases from water by aeration.

The listing below reads like a roster of the Great Names of American Industry . . . but actually it is simply a partial list of Elgin users!

These are firms and institutions you know well . . . firms that have won the respect of the entire business world for the thoroughness and discrimination with which they choose equipment and services.

All of them have relied upon Elgin products and skill to meet their water conditioning needs . . . often critical and demanding requirements that posed complicated engineering problems. The records plainly show that this confidence in Elgin has been fully justified.

Whatever your water conditioning needs, it will pay you — in immediate results; in long range savings — to place *your* trust in Elgin.

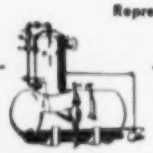
Abbott Laboratories
Aluminum Company of America
American Steel & Wire Co.
American Tobacco Co.
Arkansas Power & Light Co.
Armour & Co.
Bethlehem Steel Co.
Borden Company
California Packing Corp.
Campbell Soup Co.
Carnation Co.
Chemstrand Corp.
City of Denton, Texas
Commercial Solvents Corp.
Dr. Pepper Co.
Drewry's, Limited
Ford Motor Co.
General Electric Co.
General Mills
Howard Johnson Restaurants
Illinois State Hospitals
Iowa Power & Light Co.
Kraft Foods Co.
Kroger Grocery & Baking Co.
Liquid Carbonic Corp.
McDonald Aircraft Corp.
Monsanto Chemical Co.
Morrison Cafeterias
National Dairies
Neisner Brothers Inc.
Phillips Petroleum Co.
Quaker Oats Co.
Sinclair Refining Co.
Sisters of St. Francis Hospitals
Sky Chefs, Inc.
Southwestern Public Service Co.
Stauffer Chemical Co.
Stokely Foods, Inc.
Swift & Co.
Texas Christian University
U. S. Atomic Energy Comm.
U. S. Government (Army, Navy, Air Corps)
University of Iowa
Westinghouse Electric Corp.
F. W. Woolworth Co.

And there are hundreds more ELGIN users almost equally well known!

ELGIN SOFTENER CORPORATION

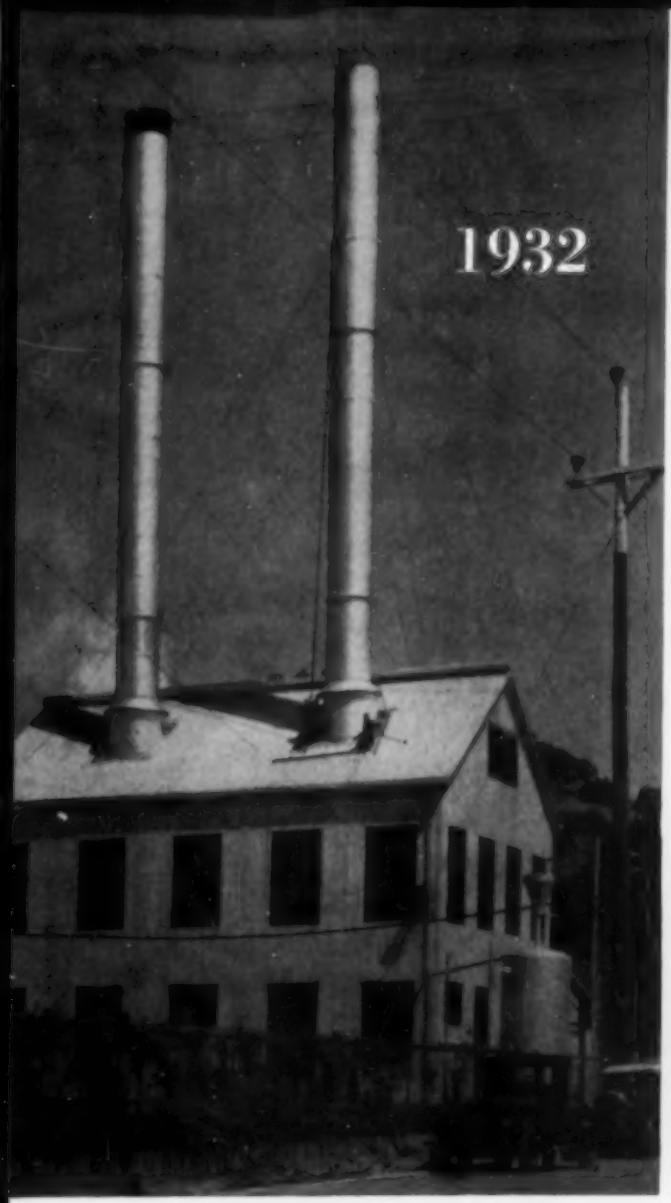
132 No. Grove Avenue, Elgin, Illinois

Representatives in Principal Cities — *In Canada: G. F. Sterne & Sons Ltd., Brantford*



DEAERATING HEATERS—supply make-up water pre-heated by exhaust steam in which CO_2 and oxygen are eliminated.

WATER FILTERS—Diatomite, sand, anthrafilt, activated carbon and oil removal filters in all types and sizes.



Installed 25 years ago... still in excellent condition... here's another Wrought Iron Plate durability story

After twenty-five years of service over boilers, these wrought iron stacks still rate a "no maintenance needed" inspection report.

These stacks, installed at San Rafael, California, Gas Plant of Pacific Gas & Electric Company, tell the kind of story repeated over and over again whenever wrought iron is used. It's a story of economy made possible because of wrought iron's unique defense against flue gas corrosion.

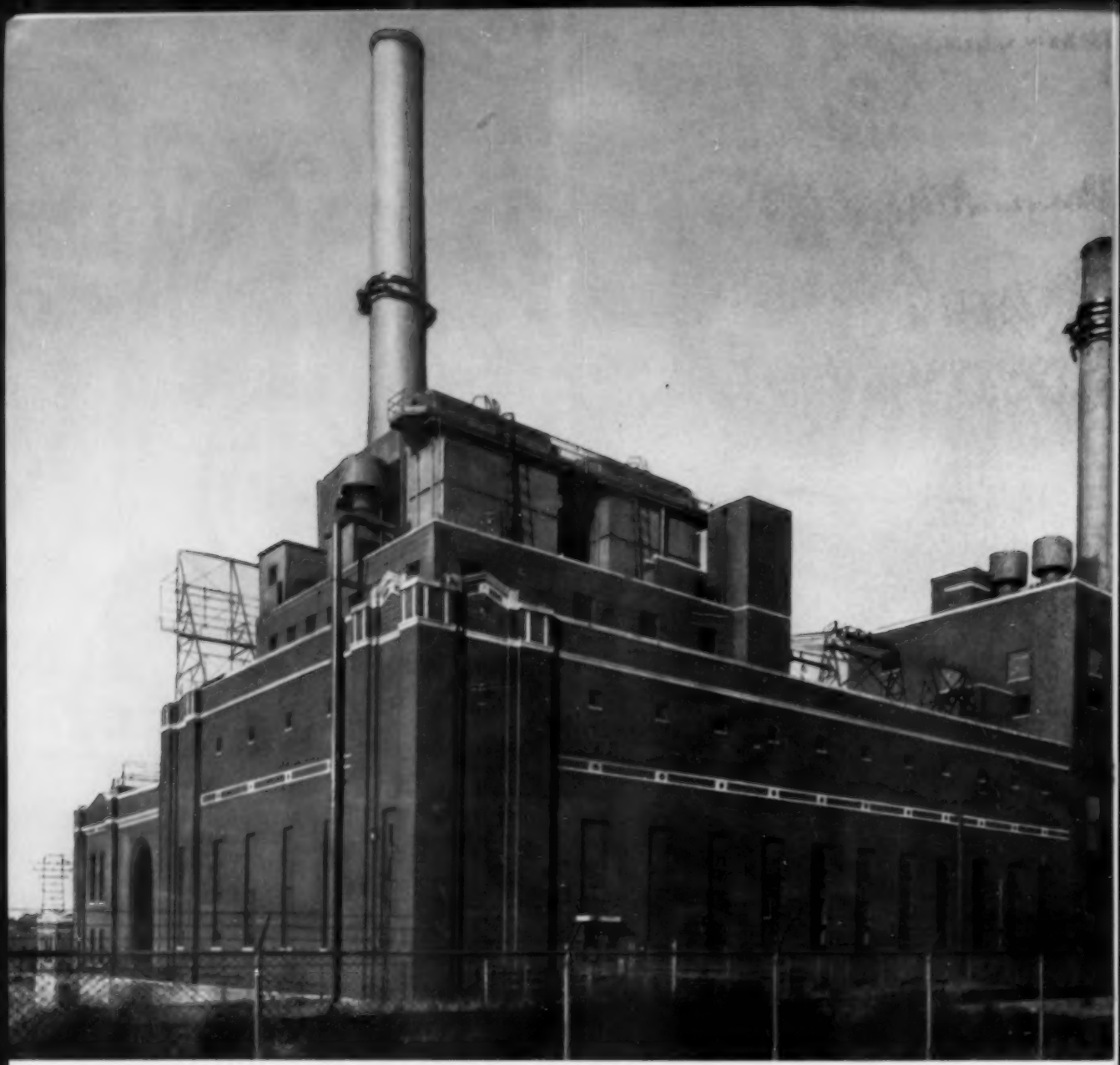
Byers wrought iron plate is an old campaigner in stack service. You'll find documented evidence of its endurance in our bulletin, *Wrought Iron for Flue Gas Conductors and Coal Handling Equipment.* Clear up a lot of questions about stack maintenance. Write us today for this helpful aid . . . it will pay you.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Division Offices in Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N.Y.

Available in Canada and throughout the world

BYERS *Wrought Iron Tubular and Hot Rolled Products*

ALSO ELECTRIC FURNACE QUALITY STEEL PRODUCTS

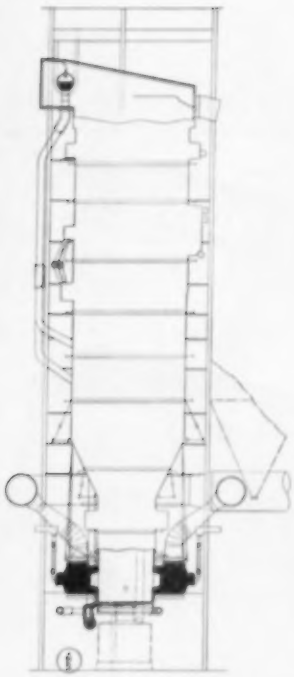


New Cyclone Furnace Unit

Installation at Joliet Station to Bring Higher Efficiency ... Lower Costs to Power Generation

Commonwealth Edison System's newest addition, at its Joliet Station, will be a B&W Radiant Reheat Boiler with Cyclone Furnaces. This is the 16th unit of this type the system has bought since 1944 and raises total system capacity served by Cyclone-fired units to over 1,600,000 kw.

Early in the development of the Cyclone Furnace by B&W, Commonwealth Edison recognized its potentialities for burning low-grade coals. The system's engineers and operators cooperated with B&W in the project, and, in September 1944, the



B&W RADIANT REHEAT BOILER WITH CYCLONE FURNACES, arranged for opposed firing, for Commonwealth Edison System's Joliet Station. Unit will deliver 2,200,000 pounds of steam per hour at 2100 psi with temperature of 1055 F, reheat to 1005 F. Boiler design is 2375 psi. Sargent & Lundy, Consulting Engineers.

CYCLONE FURNACE BOILER UNITS IN COMMONWEALTH EDISON SYSTEM

STATION	NO. OF BOILERS	NO. OF CYCLONES	TOTAL CAPACITY LB/HR	DESIGN PRESSURE	STEAM TEMP. F	REHEAT TEMP. F
Calumet	1	1	150,000	600	650	—
Waukegan	1	2	300,000	650	760	—
Fisk	2	8	1,500,000	1475	935	—
Joliet	2	6	1,200,000	1525	1010	—
Ridgeland	4	16	2,920,000	2125	1050	—
Waukegan	1	4	830,000	2050	1010	1010
Ridgeland	2	12	2,200,000	2125	1050	1000
Will County	2	10	2,400,000	2125	1050	1010
Joliet	1	9	2,200,000	2375	1055	1005
	16	68	13,700,000			

For Commonwealth Edison

first commercial application went on the line at Calumet Station. Historic Boiler Unit No. 20-A, like the new unit at Joliet, burns highly volatile Central Illinois coal with a high ash content and low ash-fusion temperature.

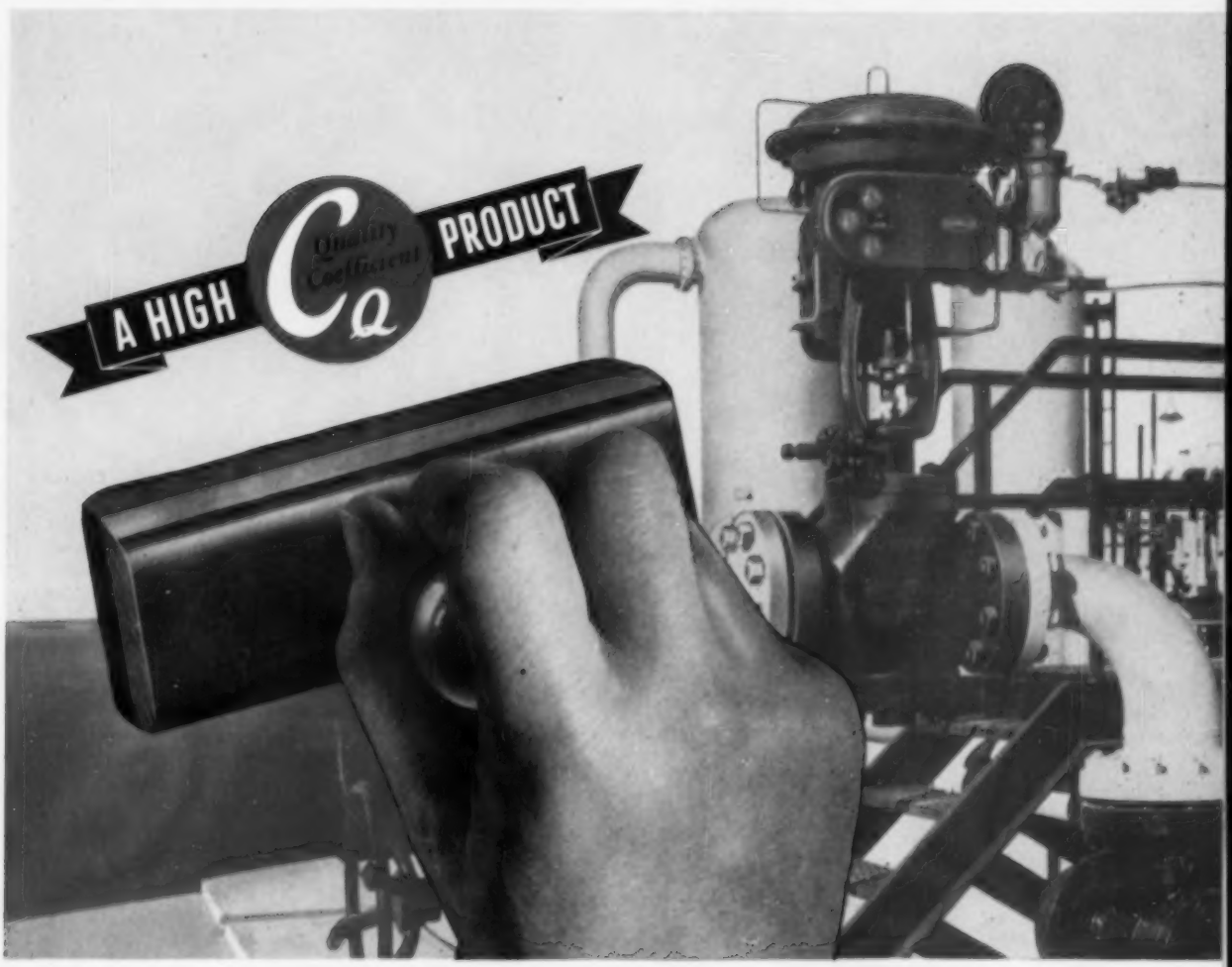
The Cyclone Furnace simplifies the entire process of coal preparation, combustion, ash segregation, and ash handling and effects savings in most of the elements of power generation costs.

In service or on order, 64 boilers with 220 Cyclone Furnaces throughout the country serve a total capacity of over 6,600,000 kw. They merit examination in connection with your next installation. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

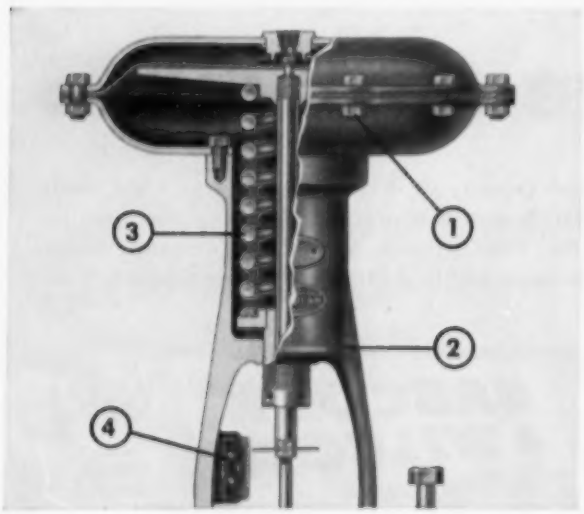
G-820-CS

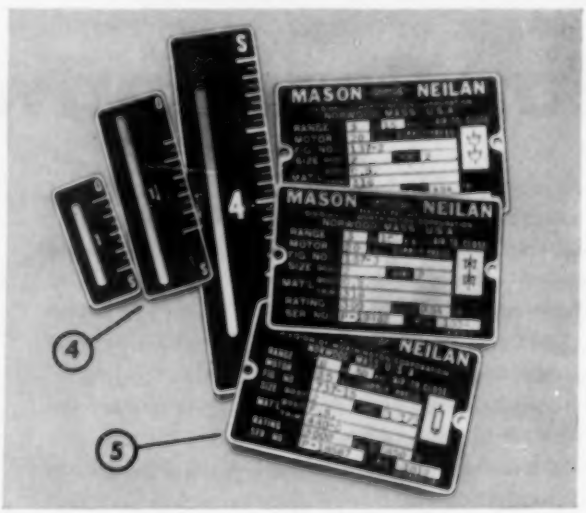
BABCOCK & WILCOX

BOILER DIVISION



(1) Bolted diaphragm case assures tightness, offers no pockets to accumulate moisture, permits use of flat stock diaphragms in emergency. (2) Cast iron yoke provides inherent rust resistance and rigidity — cannot get out of alignment. (3) Standard 6-30 psi range springs available (at no extra cost) for easy interchangeability with 3-15 psi range. (4) Stroke scale shows actual increments of plug travel. (5) Full specification data on serial plate gives complete information at a glance.





Masoneilan Control Valves Pioneer in

Design To Cut Downtime!

Practical Engineering Builds In Features to Speed Servicing, Reduce Time Losses

Practical engineering aims at reducing maintenance to a minimum and speeding unavoidable servicing. That's one reason Masoneilan Valves find such widespread acceptance — they combine the economies of long life, low service costs and minimum downtime.

Mason-Neilan pioneers many high C_q design features with the *maintenance man* in mind — making his job simpler and more speedily accomplished. Consider, for example, these ten ways in which proper design helps save important money. And for the full story on the complete line ask the office nearest you — or write

MASON-NEILAN

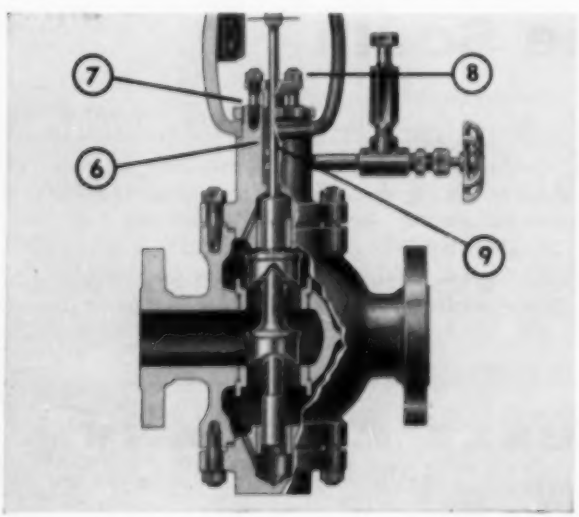
Division of Worthington Corporation

35 NAHATAN STREET, NORWOOD, MASSACHUSETTS

MASONEILAN

Sales Offices or Distributors in the Following Cities: New York • Syracuse
Chicago • St. Louis • Tulsa • Philadelphia • Houston • Pittsburgh
Atlanta • Cleveland • Cincinnati • Kansas City • Phoenix • Detroit
San Francisco • Louisville • Salt Lake City • El Paso • Albuquerque
Charlotte • Los Angeles • Corpus Christi • Denver • Appleton
Birmingham • New Orleans • Seattle
Mason-Neilan Regulator Co., Ltd., Montreal and Toronto

(6) Split-ring, preformed packing assures long service, ease of replacement. (7) Motor is easily removed from bonnet without disturbing packing box. (8) Bolted packing box assures maximum seal with minimum friction; provides visual check on packing life. (9) Superfinished stems move freely, reduce packing box friction, increase packing life. (10) Interchangeability of trim parts assures accurate fit of replacements, speeds conversion for change of process.



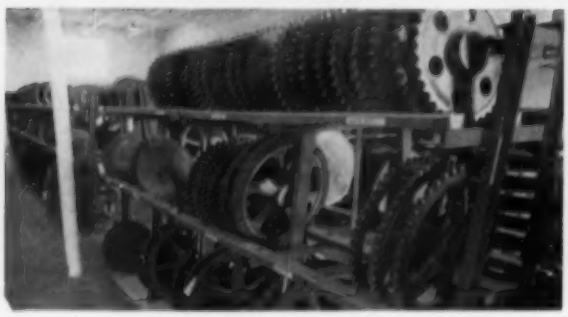
For more information, use Reply Card—Page 121

Dallas Warehouse and District Office, 8601 Sovereign Row

Atlanta Warehouse and District Office, 1708 Ellsworth Industrial Drive

Attractively packaged chain stock

Quick service on elevator buckets



Off-the-shelf service on sprockets

Large stocks of cast chains

CHAIN BELT serves the South ...from the South

When you need chain...sprockets...buckets...idlers...pulleys...bearings...or couplings, the best (the name is Rex) is as near as your CHAIN Belt Distributor. And to assure that his stocks are always complete and ready to meet your emergencies, CHAIN Belt Company maintains district warehouses and sales offices to serve the South in Atlanta and Dallas.

CHAIN Belt Company is appreciative of its share of benefits from the great industrial expansion of the South. In return, we assure you that CHAIN Belt service to you will be our very best. CHAIN Belt Company, 4724 West Greenfield Avenue, Milwaukee 1, Wisconsin.

CHAIN BELT COMPANY

Milwaukee 1, Wisconsin

Readily Available Westinghouse Fans

Meet your Fume and Dust Removal Requirements

Whatever your air handling problem . . . smoke, fumes, vapor, dust, wood shavings, granular material or ventilating . . . these Westinghouse fans are designed to handle or remove them . . . efficiently and economically.

INDUSTRIAL FANS (Steel Casing) . . . high efficiency for general Air Handling; fume and dust removal; 11 sizes, each with 3 types of wheel for specific applications. Wheel diameters 19" to 64"; inlet diameters 11" to 37".

INDUSTRIAL FANS (Cast Iron Casing) . . . ruggedly built, corrosion resisting. For low volume fume or dust removal, materials conveying, industrial drying and cooling. In 10 sizes, each with 3 types of wheel for specific applications. Wheel diameters 8" to 34"; inlet diameters 4½" to 18".

VENTILATING SETS (Direct-Connected) . . . compact, efficient, ready-to-run. Especially suited for small ventilating installations. Cleanable radial blade wheel minimizes problem of handling airborne dirt and grease. Six sizes. Wheel diameters 6" to 15"; inlet diameters 6" to 14".

VENTILATING SETS (V-belt driven) . . . self-contained. Install indoors or outdoors in a wide variety of heating, ventilating or air conditioning applications. Twelve sizes. Wheel diameters 9" to 30"; inlet diameters 10" to 32⅞".

These leading industrial distributors stock Westinghouse Ventilating Sets and Industrial Fans

FORSLUND PUMP AND MACHINERY CORP.
Kansas City, Missouri
Wichita, Kansas

MILLS & LUPTON SUPPLY CO.
Chattanooga 2, Tennessee
Phone: 6-6171

INDUSTRIAL SUPPLY DIV. OF FOREST PRODUCTS CO.
Kalispell, Montana
Phone: 5900

STRONG, CARLISLE & HAMMOND CO.
Cleveland 13, Ohio
Phone: Tower 1-8800

GIERKE-ROBINSON CO.
Davenport, Iowa
Phone: Davenport 2-1781

McCOMBS SUPPLY CO.
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SOMERS, FITLER & TODD CO.
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Youngstown 9, Ohio
Phone: Sweetbriar 9-1556

HAHNEL BROS. CO.
Lewiston, Maine
Phone: Lewiston 4-6477

MOORE-HANDLEY HARDWARE CO., INC.
Birmingham, Alabama
Phone: Alpine 2-4121

Nashville, Tennessee
Phone: Amherst 9-5631

Mobile, Alabama
Phone: Hemlock 3-7411

CAREY MACHINERY & SUPPLY CO.
Baltimore 13, Maryland
Phone: Broadway 6-1600

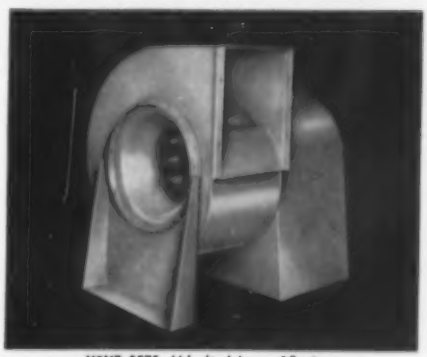
MILL & INDUSTRIAL SUPPLY
Louisville, Kentucky
Phone: Clay 3643

If there isn't one near you, call your Sturtevant Division Sales Engineer, or write Westinghouse Electric Corporation, Dept. 26E, Hyde Park, Boston 36, Mass.

WESTINGHOUSE AIR HANDLING

J-80618A
YOU CAN BE SURE...IF IT'S Westinghouse

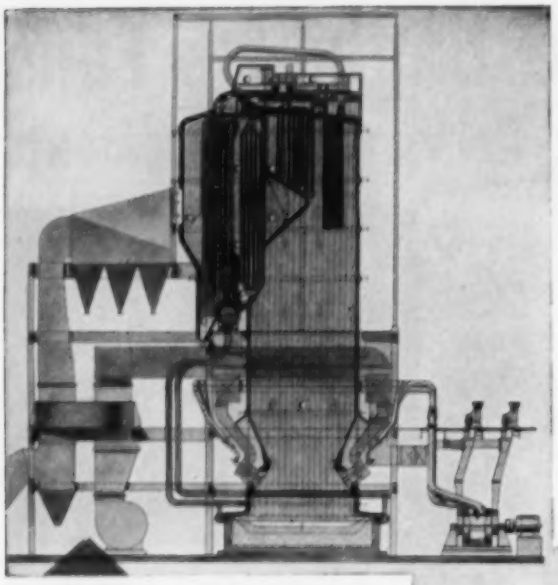
VENT SETS: Direct-connected, 6 sizes



VENT SETS: V-belt driven, 12 sizes

INDUSTRIAL FANS: Cast iron casing, 10 sizes

INDUSTRIAL FANS: High-efficiency steel casing, 11 sizes



You get FREE RILEY

We mean by "Fuel Insurance" simply that the Riley TURBO FURNACE is designed to burn the "worst" fuel that can be anticipated. Low volatile *Fluid Coke**, for example, is burned with ease in the TURBO FURNACE; high ash, low fusion temperature *coals* are efficiently burned . . . and without slagging difficulties. Complete combustion of a high moisture fuel

Delaware Power and Light Co. will burn the Fluid Coke from the new Tidewater Oil Flying "A" Refinery in three 500,000 lbs/hr Riley TURBO FURNACE Units. Refinery Gas, Oil, Coal will be standby fuels. C. F. Braun & Co., Engineers and Contractors

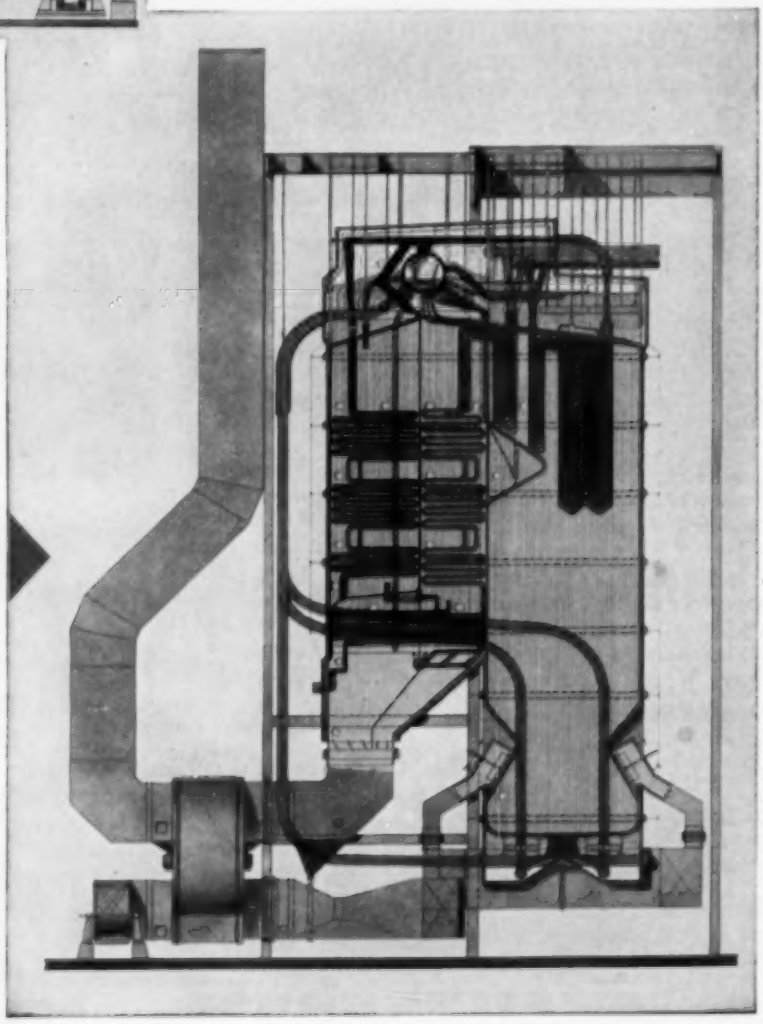
* *Fluid Coke*, is an extremely hard almost pure carbon by-product of the most recent development in catalytic cracking *to burn effectively*. It needs a furnace that provides high heat concentration after being reduced to required fineness by special Riley Pulverizers.

★ ★ ★

Louisiana Power and Light Co. will burn natural gas in its 1,550,000 lbs/hr Riley Reheat TURBO FURNACE Unit—it can quickly utilize oil, coal, lignite, refinery coke when economically justified.
Ebasco Services, Inc., Engineers

★ ★ ★

The TURBO FURNACE is enjoying rapid acceptance. It was formally introduced in the Fall of 1955 following extensive operation of actual installations that thoroughly established Riley's claims for its performance and design. Since then, thirteen TURBO FURNACE units have been sold to public utilities and large industrial companies. The total steaming capacity of these thirteen boilers exceeds 8,000,000 lbs/hr.

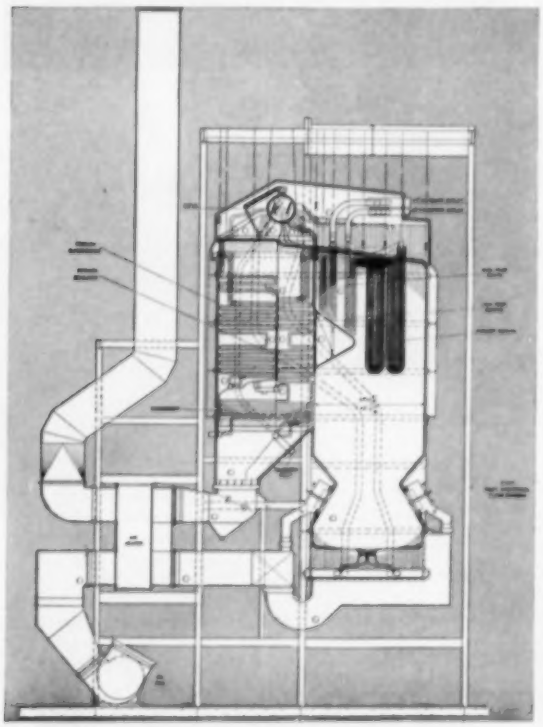


RILEY DESIGNS, MANUFACTURES AND INSTALLS COMPLETE STEAM GENERATING UNITS AND FUEL BURNING EQUIPMENT FOR PUBLIC UTILITY AND INDUSTRIAL POWER PLANTS

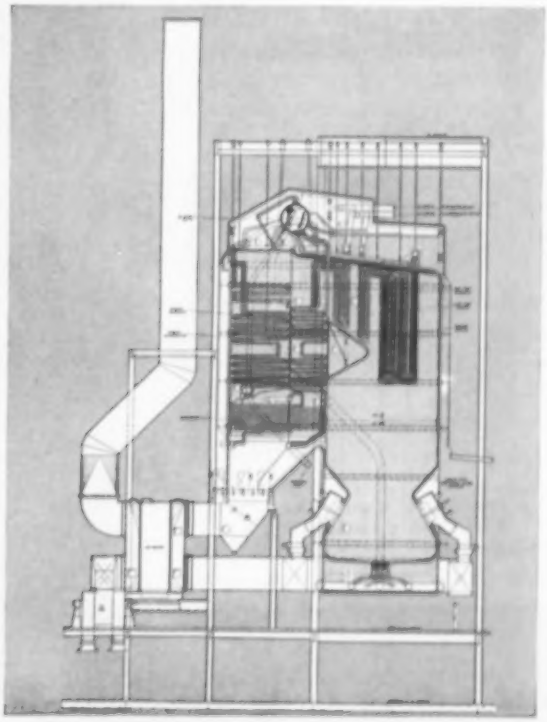
FUEL INSURANCE with the TURBO FURNACE

such as *lignite* is accomplished in the high temperature and turbulence of the combustion zone; the TURBO FURNACE not only utilizes *gas* and *oil* efficiently, but offers the quickest and least costly means by which to convert from *gas or oil* to solid fuels.
There is no premium for TURBO FURNACE "Fuel Insurance" . . . it is competitively priced.

Its "extra dividends" include clean furnace walls without the use of wall deslaggers, negligible combustible losses, elimination of the problem of fly ash disposal, lower overall height of unit, one level burner operation and the elimination of burner refractory and its maintenance. Write for complete details to Riley Stoker Corporation, Worcester, Mass.



Dallas Power & Light Company will burn natural gas and oil. Texas Lignite in the future in this 1,250,000 lbs/hr Reheat Unit. Ebasco Services, Inc., Engineers.



Texas Electric Service Co. will burn natural gas and oil in this 825,000 lbs/hr Reheat Unit. It can quickly convert to pulverized coal. Ebasco Services, Inc., Engineers.

A survey of your plant by a consulting engineer could show ways of making surprising savings in your power costs.

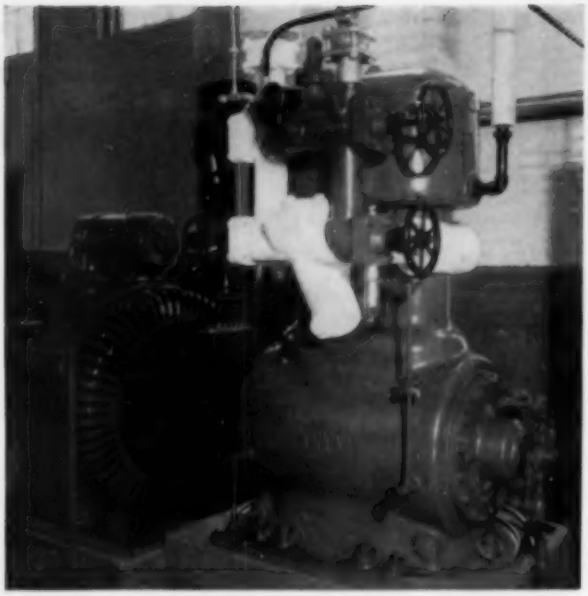
RILEY
Stoker Corporation
WORCESTER, MASSACHUSETTS

Sales Offices: Worcester, New York, Philadelphia, Buffalo, Pittsburgh, Cleveland, Detroit, Chicago, Cincinnati, Charlotte, New Orleans, Atlanta, St. Louis, Kansas City, St. Paul, Houston, Denver (Englewood), Salt Lake City, Los Angeles, San Francisco, Portland, Seattle.

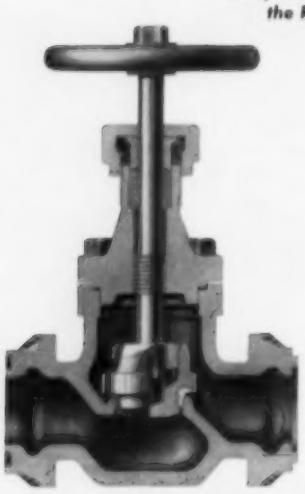
For more information, use Reply Card—Page 121

For the Ultimate in Ammonia Equipment Specify

FRICK TRADE MARK

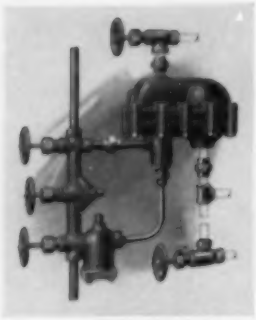


Frick Enclosed Ammonia Compressors—The Standard of the Refrigeration Industry →

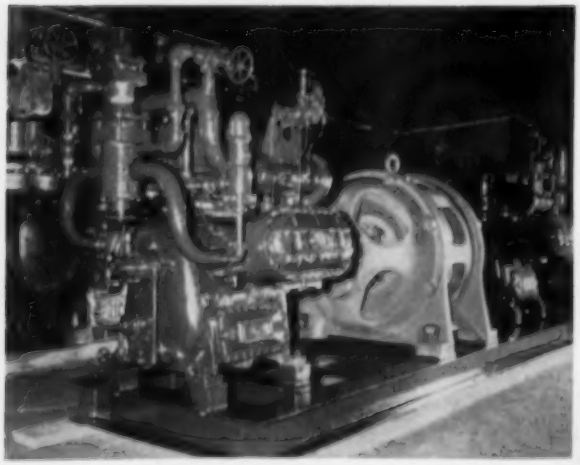


Frick Valves Have High-angle Seats and Oversized Stems, Are Good For Many High-Pressure Jobs

Condensers, Coils and Coolers Are Furnished in All Types and Sizes



Float Control Valve with By-pass Manifold and Strainer



"ECLIPSE" Ammonia Booster and High-Pressure Machines Have Multiple Cylinders, High Running Speeds

Whether you need a compressor, condenser, cooler, coil or control—you get only the most dependable when you insist on equipment bearing the Frick trademark. Generations of experience with ammonia refrigeration are back of our recommendations and products: write for literature and estimates on your requirements.

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA. U.S.A.

Also Builders of Power Farming and Sawmill Machinery

Designed to keep you in production

Westinghouse high-voltage starters with type BAL fuse

Fault interruption for motors and power systems is provided by limiting and interrupting a fault in less than ½ cycle. Instantaneous interruption minimizes possible damage to the affected motor and isolates the fault so other equipment is not shut down.

Westinghouse high-voltage starters are available for induction or synchronous motors up to 3000 hp and for power systems up to 250,000 kva at 4800 volts.

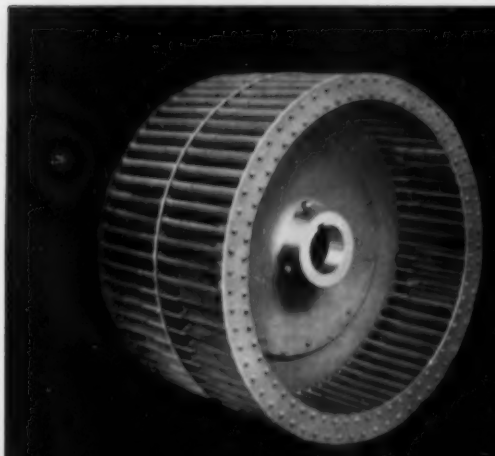
Reliable Westinghouse equipment such as the new type H air break contactor—good for millions of operations—plus the exclusive space-saving type BAL fuse for increased reliability—keeps production moving!

Call your Westinghouse sales engineer about installing the finest high-voltage starter in your plant. Or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. Ask for Bulletin B-6535. J-21935

YOU CAN BE SURE...IF IT'S

Westinghouse

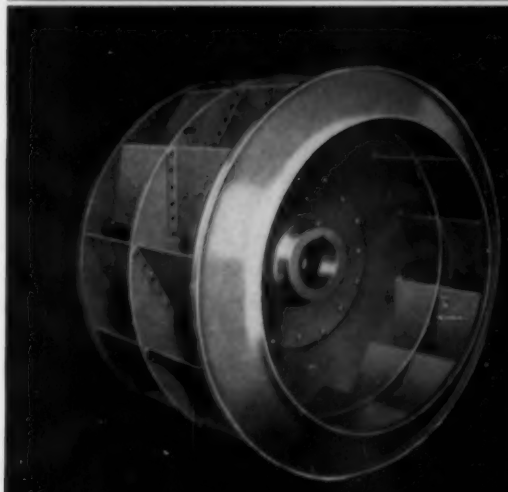
American Blower Fan Wheels



SIROCCO WHEELS

for forced and induced draft duty

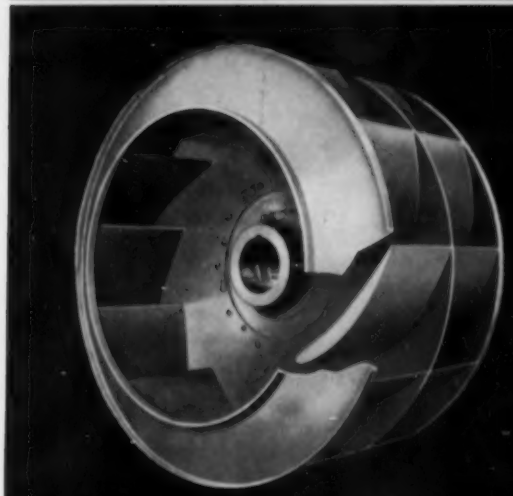
- For balanced draft or pressurized furnace
- Low tip speed
- Die-formed, forwardly inclined blades and heavy streamline inlets
- Used in power plants the world over



AHS WHEELS

for forced and induced draft duty

- Backwardly inclined, nonoverloading horsepower characteristic
- For given duty operates at higher R.P.M.
- Single thickness flat or curved blade
- Heavy rolled streamline inlets

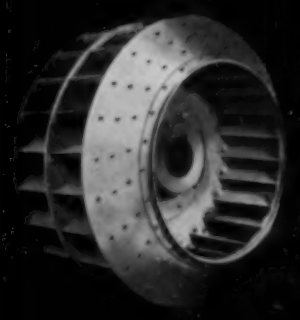


AIRFOIL BLADE WHEELS

primarily for forced draft duty

- Blades are of airfoil cross section, die formed and reinforced as required
- High mechanical and static efficiency
- Nonoverloading power characteristic
- Available with vanes and/or boxes

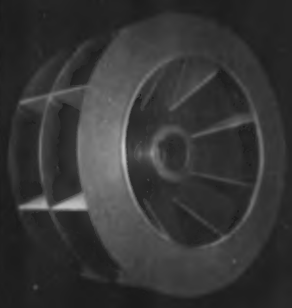
Meet Peak Efficiency Standards



Radial tip blade wheel

RADIAL BLADE WHEELS
for forced, induced and gas recirculating duties

- Pressure characteristic favorable to gas recirculating application where unusual system pressures prevail
- Designed for severe temperature and pressure duty
- Available with straight radial or radial tip blades

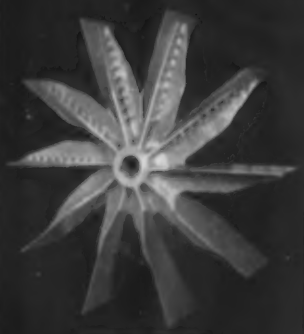


Straight radial blade wheel

Rim type wheel for primary air fans

SINGLE INLET RADIAL BLADE WHEELS FOR PRIMARY AIR, VENT, AND OVER FIRE DUTY

- Designed for high temperature, high pressure applications
- Radial or backwardly inclined blades, single inlet
- Over 1200 primary air fans in operation



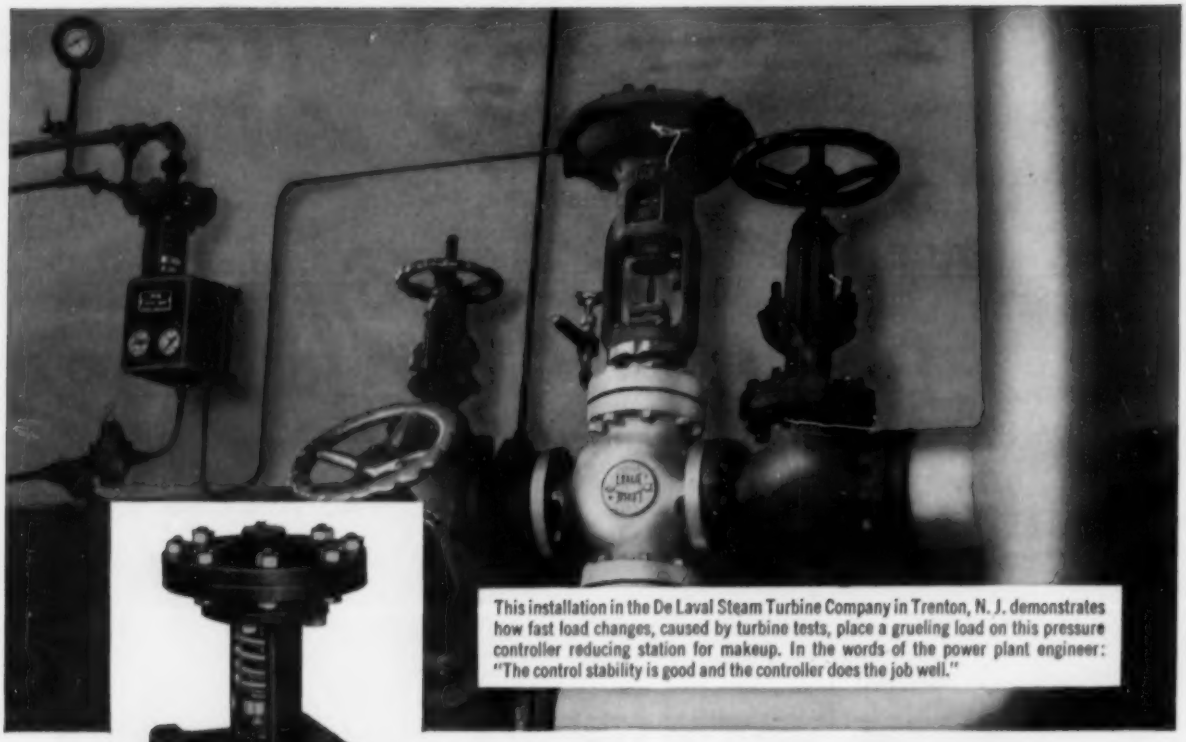
Rimless wheel for vent and over fire fans

IF YOUR plans include mechanical-draft equipment—for new installations or as replacements—consult your American Blower sales engineer. He can give you helpful information on job-fitted American Blower equipment to meet your power-plant requirements. Call our nearest branch office or write: American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ont.

AMERICAN BLOWER

Division of AMERICAN-Standard

For more information, use Reply Card—Page 121



This installation in the De Laval Steam Turbine Company in Trenton, N. J. demonstrates how fast load changes, caused by turbine tests, place a grueling load on this pressure controller reducing station for makeup. In the words of the power plant engineer: "The control stability is good and the controller does the job well."

Leslie Pressure Pilot

Narrow Band Pressure Control *with Stability*

Wide band stability and narrow band proportional control are uniquely combined in the Leslie Control Pilot without need for extra mechanisms to correct for over-sensitivity.

While the pilot responds to small, *definite* pressure changes, it "sorts out" and "ignores" the small, spurious* disturbances common to most control systems since it does not follow nor magnify these disturbances, cycling and hunting are eliminated. It is ideal for systems with short lag factors.

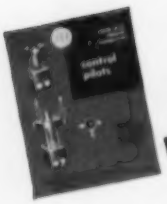
*not directly related to process variables but resulting from pipeline friction and turbulence.

NO COSTLY EXTRAS

The "designed-in" stability and high capacity of Leslie Pressure Control Pilots also eliminates costly "extras" . . . there is no need for automatic reset, valve positioners or filter-type air sets. You get stable, reliable control *without* fussy adjustments and with *ordinary* plant air or water for the operating medium.

MORE INFORMATION

Ask your Leslie engineer to give you the complete story of the exclusive features that make Leslie Controllers ideal for straight pressure control problems. He's listed in your classified directory under "valves" or "regulators". Send for bulletin described at left.



Send for Bulletin 5303 that gives complete technical data and typical application sketches for the Leslie Pressure Control Pilot

TRADE LESLIE MARK

REGULATORS AND CONTROLLERS

LESLIE CO., 261 GRANT AVENUE, LYNDHURST, NEW JERSEY

MARLEY IS STILL TESTING TOWERS

Here are the current results—a consecutive list of ALL acceptance tests conducted by Marley during 1956 on Cross-Flow industrial towers. Although towers tested were of many sizes and capacities, operating under varying conditions and in various parts of the country, there is one "common denominator" in all the tests—the positive performance of Marley cooling towers. Better than words, better even than written guarantees, these tests are your assurance of complete performance satisfaction when you purchase a Marley cooling tower.

The Marley Company has long pioneered the policy of "test your tower," for we believe that every purchaser is entitled—if not obligated—to know the performance of his tower in exact and authoritative terms. We also believe that every prospective purchaser is entitled to know the performance record of Marley towers, and for this reason have consistently published the results of Marley's own tower-testing program.

If you'd like to know the Marley method of measuring performance of cooling towers, regardless of make or vintage, we invite you to write for our technical publication, "TEST YOUR TOWER."

TEST NO.	TYPE OF SERVICE AND LOCATION	SPECIFIED CONDITIONS				TEST RESULTS	
		Gallons Per Minute	Hot Water Temp.	Cold Water Temp.	Wet Bulb Temp.	Degrees Cold Water Temp.	Percent Capacity
1	Generating Station—North Central	49,200	100.8°	85°	74°	+.26°	+2.3%
2	Generating Station—Southwest	28,000	99.5°	83°	74°	+.15°	+1.5%
3	Chemical Plant—East Coast	33,000	105°	86°	81°	+.43°	+12.7%
4	Generating Station—Mid-West	62,400	107.5°	90°	76°	+.02°	+.13%
*5	Petrochemical Plant—Mid-West	10,000	105°	83°	76°	—.25°	—2.14%
6	Petroleum Refinery—Mid-West	8,500	120°	85°	76°	+.15°	+1.35%
7	Generating Station—Mid-West	26,000	110°	91°	75°	+.70°	+3.4%
*8	Petroleum Refinery—Gulf Coast	21,000	113°	90°	80°	—.45°	—2.85%
9	Petrochemical Plant—Gulf Coast	6,000	105°	85°	80°	+.06°	+.69%
10	Petrochemical Plant—East Central	21,000	120°	85°	73°	—.2°	—1.5%
11	Generating Station—Southwest	38,700	93°	78.5°	65°	—.4°	—2.15%
*12	Generating Station—North Central	7,180	101°	87°	74°	+.1°	+.77%
13	Generating Station—East Coast	26,400	96°	86°	79°	+.30°	+4.17%
14	Petroleum Refinery—Mid-West	8,000	120°	84°	74°	+.70°	+6.4%

★ Tested in accordance with Cooling Tower Institute test procedure ATP-105 and observed by CTI representative.

FOR YOUR FREE COPY, MARK AND MAIL THE COUPON TODAY

MARLEY

The Marley Company

Kansas City, Missouri

Technical Services Dept., 230
The Marley Company
222 W. Gregory Blvd.
Kansas City, Mo.

Please send me a copy of your brochure, "TEST YOUR TOWER."

Name .....

Firm .....

Address .....

City ..... State .....

For more information, use Reply Card—Page 121

The Booming South and Southwest . . .

New Plants — Expansions

- √ Manufacturing Plants
- √ Utility Plants
- √ Large Service Plants

Highlights for May, 1957

These highlights briefed from SPI's SOUTHERN INDUSTRIAL NEWS SERVICE, a monthly publication issued exclusively to SPI advertisers and their representatives through the South and Southwest.

South Atlantic

$500,000 expansion underway in **Dover, Del.** for **International Latex Corp.** . . . **DuPont Co.** planning $1,500,000 addition to research center in **Wilmington, Del.** . . . $3,000,000 technical center underway for **Atlas Powder Co.** in **Wilmington, Del.**

Chris-Craft Corp. to erect 120,000 sq ft plant in **Pompano Beach, Fla.** . . . **U. S. Industries, Inc.** planning **USI Technical Center, Inc.** at **Pompano Beach, Fla.** with installations alone to cost $1,000,000 . . . $500,000 aluminum sulfate plant to be erected at **Port St. Joe, Fla.** for **General Chemical Div. of Allied Chemical & Dye Corp.**

$1,000,000 warehouse planned for **Bethlehem Steel Co.** at **Federal Hill, Md.**

Multi-million dollar plant at **Farmville, N. C.** to be erected by **American Cyanamid Co.** . . . At **Hendersonville, N. C.** $275,000 clothing manufacturing plant being erected for **Mountain Top Co.** . . . $150,000 food processing plant being planned for **Williamston, N. C.**

Lake Shore Industries, Inc. to construct at **Batesville, S. C.** $500,000 plant to manufacture blades for jet and commercial gas turbine engines . . . $400,000 plant containing 20,000 sq ft of manufacturing space planned for **Hartford Machine Screw Co.** at **Greenville, S. C.** . . . $450,000 project underway for **Startex Crash Mills** at **Spartanburg, S. C.**

$1,000,000 glass plant being erected on 60 acre tract in **Martinsville, Va.** for **Virginia Glass Products Corp.** . . . $15,000,000 plant for **Dow Chemical Co.** underway in **James City County, Va.** for manufacturing Zefran, a synthetic textile fiber.

East South Central

Electric steel-making furnace, adding 1,980,000 tons of ingot annually, being added to **Republic Steel Corp.** plant in **Gadsden, Ala.** . . . **Southern Precision Pattern Works** building $150,000 plant in **Birmingham, Ala.** to up production 50%.

17 acres in **Louisville, Ky.** is site of $250,000 maintenance plant for **A. C. Horn Co.** of Sun Chemical Corp.

$1,000,000 plant for **Hardboard Construction Corp.** underway in **Natchez, Miss.** . . . **Richton Tie Co.** erecting $125,000 debarking plant on 30 acre site in **Philadelphia, Miss.** . . . **Purvis, Miss.** will welcome the opening of **Pontiac Refinery** in July.

Combustion Engineering Inc. spending $30,000,000 to expand its nuclear power activities at **Chattanooga, Tenn.** . . . 40,000 sq ft warehouse, costing $260,000, to be erected by **DuPont Co.** at **Chattanooga, Tenn.**

West South Central

$4,000,000 plant underway in **Arkadelphia, Ark.** for **Tectum Corp.** . . . **Indianapolis Glove Co.** constructing $210,000 plant in **Mt. Ida, Ark.** . . . Aluminum sulfate plant to be erected in **Pine Bluff, Ark.** for **Consolidated Chemical Corp.** . . . $100,000 plant underway in **Van Buren, Ark.** for **Kay Chair Co.** . . . **Indianapolis Glove Co.** to construct $250,000 factory in **Waldron, Ark.**

$5,000,000 expansion planned by **Kaiser Aluminum & Chemical Co.** in **Baton Rouge, La.** . . . **Gaylord Container Corp.** underway with its $4,000,000 project in **Bogalusa, La.** . . . **Crown Zellerbach Corp.** and **Tima, Inc.** have formed the **St. Francisville Paper Co.** which will build and operate $31,000,000 mill in **St. Francisville, La.** . . . $300,000 plant underway for **H. W. Lay & Co.** in **Harahan, La.** . . . 30,000 sq ft sewing plant, costing $150,000, underway for **J. M. Wood Mfg. Co.** in **Waco, La.**

$38,000,000 jet fuel plant being constructed on 1,275 acres in **Muskogee, Okla.** by **Callery Co.** who will operate the plant for the Navy . . . **Continental Oil Co.** constructing $1,750,000 natural gasoline plant at **Short Junction, Okla.** . . . 500,000 kw, $20,000,000 electric power station for **Tulsa, Okla.** planned by **Public Service Co. of Okla.**

$600,000 abattoir and packing plant planned for **Freedman Packing Co.** in **Austin, Tex.** . . . **Humble Oil & Refining Co.** constructing benzene plant to produce 24,000,000 gallons annually in **Baytown, Tex.** . . . Multi-million dollar Transite asbestos-cement pipe plant underway for **Johns-Manville Corp.** in **Denison, Tex.** . . . Multi-million dollar sulphur mining plant underway in **Fannett Dome, Tex.** for **Texas Gulf Sulphur Co.** . . . **Baker Oil Tools, Inc.** planning $3,000,000 plant on 75

acre site in **Houston, Tex.** . . . 50 acre tract in **Houston, Tex.** being developed in $1,000,000 expansion program of **Armco Drainage & Metal Products Co.** . . . **Reynolds Metals Co.** expanding to sum of $25,000,000-$30,000,000 in **La Quinta, Tex.** . . . $1,000,000 plant underway for **Garrett Oil Tools, Inc.** in **Longview, Tex.** . . . **American Can Co.** constructing $1,000,000 plant on 10 acre site in **San Antonio, Tex.**

Kansas & Missouri

87,000 sq ft site purchased in **Wichita, Kans.** for expansion of warehouse and office facilities of **Westinghouse Electric Supply Corp.**

$125,000 steel fabricating plant being erected on 10 acre site in **Columbia, Mo.** for **Riback Industries.**

Books for the Plant Engineer

Plastics Progress — 1955

PAPERS AND DISCUSSIONS AT THE BRITISH PLASTICS CONVENTION
PUBLISHED BY PHILOSOPHICAL LIBRARY INC.
15 East 40th St., New York 16, New York
432 pages
Price, $17.50

This book brings together some of the more important recent developments, and contains chapters under the general headings of polymer structure and properties; expanded plastics; thermoplastics; extrusion; work study and productivity; injection molding; patents; foundry resins and glass reinforced plastics.

Many of these papers carry original investigations. The chapters themselves are based on the papers given at the British Plastics Convention, June, 1955. These papers are given in full and a complete record of the discussion is included.

Power Plants

BY ALEXANDER H. ZERBAN AND EDWIN P. NYE
PUBLISHED BY INTERNATIONAL TEXTBOOK COMPANY
Scranton 9, Pa.
655 pages
Price, $8.50

This book deals with the mechanical engineering fundamentals of all types of power generating equipment. Chapter titles include: The Steam Plant Cycle, Fuels, Combustion, Steady State Heat Transfer, Furnace Heat Transfer, Steam Generators, Steam Prime Movers, Instruments and Controls, Power Plant Economics, and a section on problems and solutions.

Emphasis is placed on analysis of power plant economics, and the examples involve problems which have actually arisen in practice.

Steels for the User (Third Edition)

BY R. T. ROLFE
PUBLISHED BY PHILOSOPHICAL LIBRARY INC.
15 East 40th St., New York 16, New York
399 pages
Price, $10.00

The aim of this book is to bridge the gap between science and practice for carbon steels in industry. The scientific aspects of the various processes are treated, but these are illustrated by ample data and examples from actual service. The book deals primarily with carbon steels, and alloy steels are discussed only for duties that carbon steels do not serve.

Southern Sales Service

NEW DIRECTORY for Plant Engineers

See Page 128

Mechanical Vibrations

BY J. P. DEN HARTOG
PUBLISHED BY MCGRAW-HILL BOOK COMPANY, INC.
330 West 42nd St., New York 36, New York
436 pages
Price, $9.00

While this book is intended primarily for junior or senior engineering students, it is valuable as a reference for practicing engineers. It deals with vibration phenomena in a technical manner and emphasizes the many applications of principles and calculations to the practical vibration problems encountered by the practicing engineer. In this fourth edition the number of problems has been increased and new material has been added.

Electronics in Industry—Second Edition

BY GEORGE M. CHUTE
PUBLISHED BY MCGRAW-HILL BOOK COMPANY, INC.
330 West 42nd St., New York 36, New York
431 pages
Price, $7.50

This book presents the basic fundamentals of electronic devices as needed by men in industry and explains how they are used. Details of communication circuits are not covered extensively, but instead the uses of vapor or gas tubes are stressed.

This book supplements rather than duplicates the material found in more specialized texts.

Ball Bearing Maintenance

BY JOHNNY RIDDLE
PUBLISHED BY UNIVERSITY OF OKLAHOMA PRESS
Norman, Oklahoma
170 pages
Price, $6.00

This volume is a shop manual designed to aid the consumer in understanding the basic principles of ball bearing maintenance. Ten brief chapters explain the basic bearing types and their variations, and discuss application, operation, and maintenance problems and procedures. Extensive information is provided on correct lubrication. In simple terms, it tells how the consumer can secure better service and lower maintenance. The book is illustrated with 300 photographs and diagrammatic sketches.

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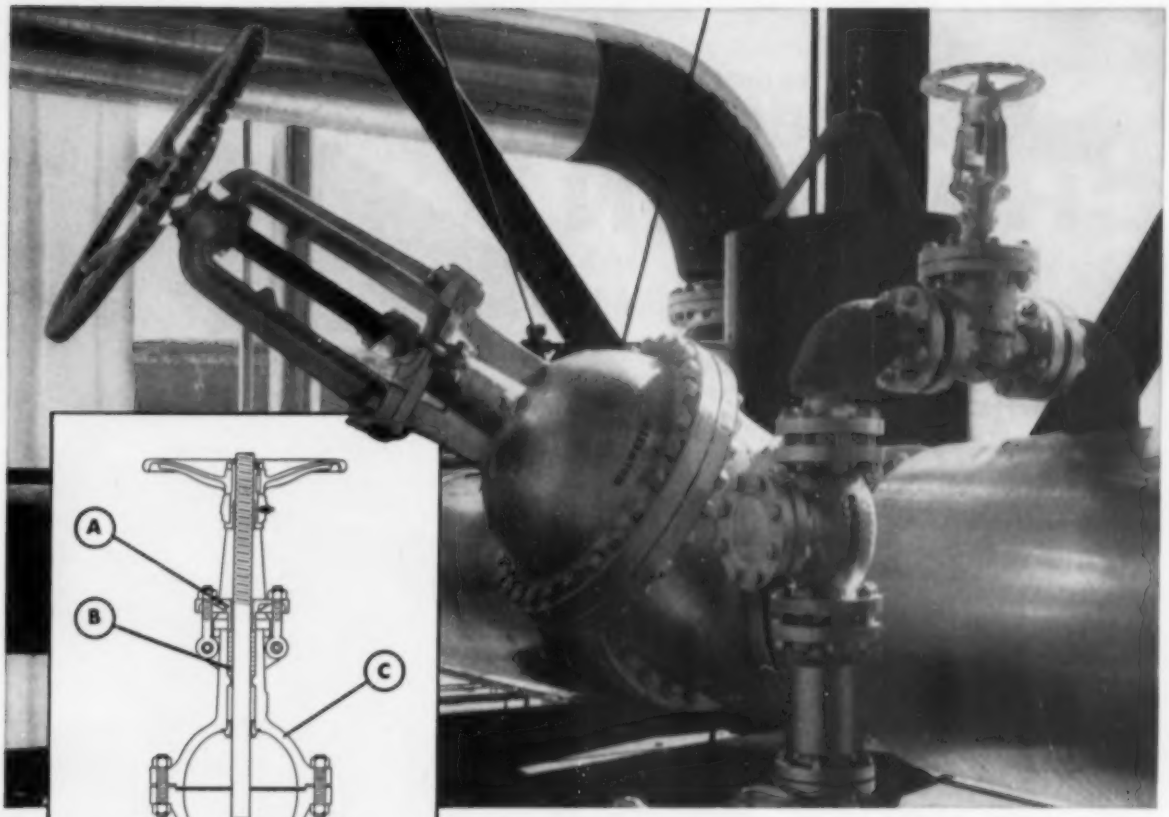

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TIMELY COMMENTS

Changing Requirements for Maintenance

Abstracted from an address by O. S. YORK, manager, maintenance engineering section, engineering service division, engineering department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., at the 8th Plant Maintenance & Engineering Conference, held concurrently with the 8th Plant Maintenance & Engineering Show at Cleveland. Du Pont has 13,000 maintenance employees in 79 plants.

INCREASING complexity of modern processes and equipment has placed an ever increasing responsibility on the maintenance forces. As a result, every maintenance head has watched maintenance cost increase steadily, and many Company executives have viewed this increase with alarm.

Everyone has been on the lookout for new and better techniques which can be used either to reduce or control these costs. Therefore, many effective improvement programs have been initiated over the years. Yet according to a reliable source, the cost for maintaining this country's industrial facilities increased 9% in 1956, an amount in excess of one billion dollars. The same source expects this cost to increase by at least another 10% this year.

Recognizing that the growth of industry as a whole is responsible for some of this increased cost, the major significance may well be a reflection of the changing requirements in the entire maintenance problem. New concepts and techniques must be developed to provide optimum maintenance cost, not necessarily minimum maintenance cost, because no longer can maintenance be looked on as a necessary evil.

I think the du Pont Company is a representative example of the chemical and petroleum industry. Today we feel that du Pont's maintenance problem is changing in magnitude, in character and in significance.

Problem Changing

The maintenance problem is changing in magnitude as the Company grows. We have to expect increased maintenance cost to maintain plants and facilities represented by an ever-increasing operating investment and maintain quality of product and continuity of operations of the complex equipment in our continuous processes.

Changing employment patterns is increasing the magnitude of the maintenance problem. For example, let us review the du Pont Company's experience for the past 15 years. Since 1940, the total increase in Company wage roll personnel has been approximately 150% of the 1940 base. The maintenance labor for the same period increased 250%. The maintenance labor roll in the du Pont Company is increasing twice as fast as all other wage rolls. As the Company grows and the processes become more complex, we expect this trend to be maintained, which indicates that in the next 10 years the number of maintenance mechanics may increase by another 50%, which will make the ratio of mechanics to others even greater.

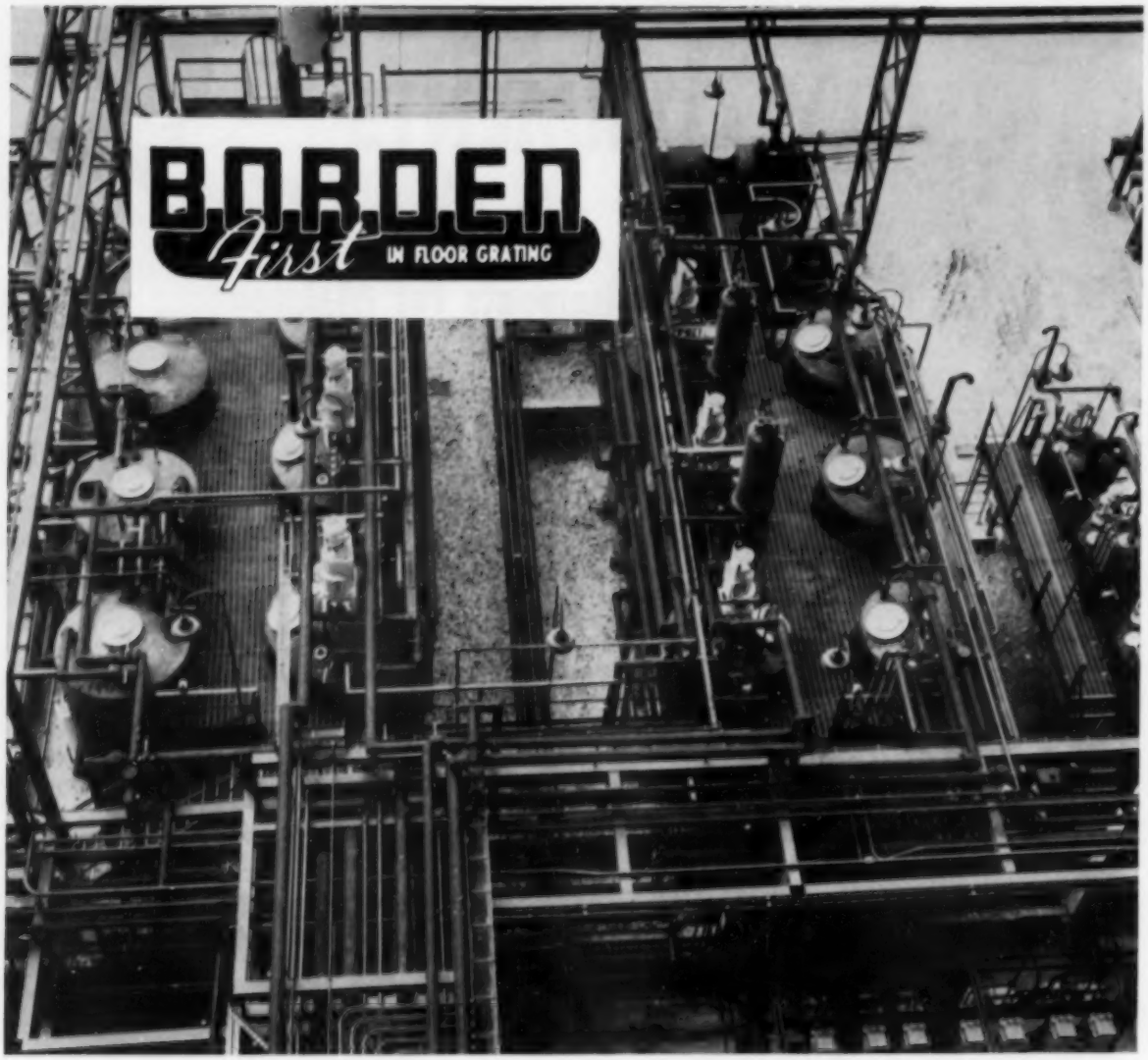
Advancing technology such as in instruments and controls is changing the character of the maintenance problem. As as example of what is taking place in the du Pont Company, let us review the same 15 year period from 1940 until 1956. Although our permanent investment has been increasing very rapidly, our rate of increase in instrument investment is even more rapid. Since 1940 we have seen the instrument investment increase 500%.

New Materials

As examples of this advancing technology in instruments and controls, we have some additional experience from our Company. The investment in special control valves has increased from $100,000 in 1944 to $6,000,000 in 1956. The investment in graphic panels, which simulates the process on the instrument control board, has increased from $100,000 in 1946 to $5,000,000 in 1956. The use of photometric analyzers, an electronic instrument for measurement based on the color spectrum, has increased from just 10 installations 7 years ago, to 170 installations in 1956.

New engineering materials are changing the

(Continued on Page 45)



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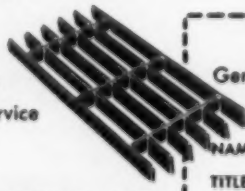

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SOUTHERN POWER AND INDUSTRY

Requirements for Maintenance (Continued from Page 43)

character of the maintenance problem. In the short period of 7 years from 148 to 1955, we have seen increased use of such plastic piping systems in the du Pont Company as saran lined steel pipe, polyethylene, polyvinyl chloride and polystyrene rubber. In the case of polyethylene, we had only one Company installation in 1948, but by 1955 there were in excess of 60 plastic piping systems installed in our Company.

As these new and improved materials of construction become available, new skill requirements, methods and techniques will be required by the maintenance organization to take full advantage of their potentialities.

Another example of the change in character is the increased precision required in machining specifications. In the 1930's, tolerances in the range of ± 0.007 in. to 0.008 in. and surface finishes in the range of 80 to 100 micro-inches were generally satisfactory to meet process requirements. Today with the increased speeds, higher pressures and temperatures required in modern processes, machining specifications of greater accuracy are essential. In a growing number of cases, we must now maintain tolerances in the range of ± 0.005 in. and surface finishes less than 10 micro-inches.

As our process trends continue, we can expect to require machining specifications that dictate tolerances of plus or minus 0.0002 in., and surface finishes of less than 5 micro-inches. Already, we have one instance in our Company where it was necessary to have a surface finish of ¼ micro-inch on a roll in order to solve a process quality problem.

Reliability

The maintenance problem will also change in character with the increasing difficulty of maintaining the operation of the mechanical plants. When our process was the batch type, a component reliability of 90% usually meant that the process was 90% available. As the processes became semi-continuous and more components were tied together to form the over-all process, the reliability of the over-all process decreased even though the same 90% component reliability was maintained.

For example, when 10 components each with 90% reliability are connected together, the over-

O. S. YORK

all reliability of the process may decrease to as low as 35%, depending on the frequency and time of outage. Likewise, as we approach the continuous process, many additional components will have to be tied-in to form the complete process.

Assuming now that the reliability of the individual component has been increased to 95% but the number of components has also been increased to 50, the over-all system availability may decrease to 10% depending on the frequency of outage. This emphasizes the necessity of improving the component reliability above 99.8% if the continuous process is to be operated economically.

The maintenance problem is changing in significance as maintenance performance exerts a greater influence on profits and return on investment. With the continued development of automatic controls, we are approaching more and more the continuous plant with minimum process hold-up time. Therefore, it is becoming

(Continued on Page 127)

Better

Let the Salesmen Help

By R. L. FULGUM
R. L. Fulgum Co.,
Atlanta, Georgia

MODERN PRODUCTS available to industry are by no means being utilized in such a way that their full potential benefits are obtained for reduced downtime and maintenance costs. Following the main ten rules listed here will decrease the burden on the plant engineer and save money for his company.

For instance, one Georgia paper mill called recently and purchased twenty stock sprockets for double strand roller chain, for use on a machine having a number of parallel shafts all turning at the same rpm and with each successive shaft driven by one strand of chain from the preceding shaft. Not until the sprockets on the machine were worn beyond further use, and an attempt made to use the stock double sprockets, as replacements, was it discovered that the rows of teeth on the double sprockets were too close for two single strands of chain to operate on them.

The machine, essential to production, was down and the factory was about three thousand miles away. This customer called us asking for air shipment of forty single strand stock sprockets, which he intended to rebore and machine, so he could mount them on these shafts instead of the twenty special double sprockets.

We had these sprockets, but plane time was a couple of hours off, and there was reboring and keyseating to be done and set screws to be installed.

We also had immediately available forty single sprockets, Taper-Lock bushings, of the right bore, already keyseated and, because of their nature, needing no set screw.

When the plane left, these sprockets were on it, ready to be installed, immediately when received, with no further preparation, or machining. This tapered bushing compensates, too, for slight variations in shaft diameters making the sprockets run more nearly concentric with the shaft, resulting in longer life.

Fluid couplings and centrifugal clutches are available today for reducing starting shocks.

Speed reducers are available for mounting directly upon headshafts or other shafts, vertical and horizontal.

A minerals processing customer, in North Georgia, is producing a higher grade product with less maintenance by controlling speeds with an adjustable speed magnetic drive that we sell.

Other customers operating plants where chemical fumes are, of necessity, ever present, have found that special corrosion-proof motors save maintenance.

The above personal experiences show only a few instances of how a salesman can genuinely serve his customers. There are capable suppliers of quality products for almost every type of service.

Anyone, following the "MAIN TEN" rules for maintenance savings, will find available to him products designed to cut his particular maintenance costs.

The "MAIN TEN" Rules for Maintenance Savings

1. Know your problem.
2. Consult with suppliers who can understand YOUR problem and understand THEIR product.
3. Let them see, and study, the problem.
4. Give them as exact data as possible regarding operating conditions.
5. Let them make a proposal for equipment to handle the job, setting forth in the proposal, not only why they feel the equipment is suitable, but what limitations it would have, with respect to your particular problem.
6. Study their proposals, and literature, as related to your job.
7. Ask if replacement parts are readily available for the suggested equipment.
8. Be sure all bearings, sprockets, chains, gears, belts, and other such items are standard items and made, as such, by more than one manufacturer.
9. If there is such equipment in operation at some other plant, try to arrange to see it, or at least check with those using it, by phone.
10. "LESS DOWNTIME WITH PROVEN PRODUCTS" is a certainty. Select only products made by dependable manufacturers and sold by reputable and able representatives.

Buying . . . . . .

Use Vendors' Services

By NORMAN C. STILES, Director of Purchases
The Chemstrand Corporation
Decatur, Alabama

PURCHASING people must recognize that the performance expected of us goes far beyond the time worn description of good purchasing — "the right material, at the right time, at the right price." Their real potential lies in bringing about true profits by reducing their company's cost of doing business. Such reductions can be in many forms.

How many times in the course of an interview with a vendors' representative have you heard the well worn phrase, "If there's anything we can do to be of assistance, just let us know"? Buyers tend to accept that statement more or less as the routine closing remark of an interview. But, this offer of service actually contains fertile ground on which a crop of attractive profits may be cultivated. As with the farmer, this crop will not return a profit without some effort on the part of those who seek reward.

Purchasing people might well voice this statement as the preamble to any agreement to buy: "We expect not only the delivery of the goods as agreed upon, but also the services necessary to assure our obtaining the maximum benefit from our purchase."

There are many ways in which we can utilize vendors' services for profit. Some areas are readily apparent while others are more obscure and require searching out. Other opportunities lie buried in the various details and procedures of our own operations.

Let's look at some areas where we might call upon our vendors for service.

MOST OF US have at one time or another been deeply engrossed in a survey or value analysis study that called for extensive researching of publications and reports from which meaningful figures were to be extracted. Sometimes finding the right publication was the hardest part of the program.

Much time and effort can frequently be saved on such projects by first calling on your suppliers to furnish up-to-date data and statistics. Since their interest in a given market or commodity is presumably as great as your own, reliable and accurate information is often forthcoming promptly and in better form and greater detail than if you had spent days trying to assemble the same facts. A profit for you? Sure. The time saved can be utilized for other profit returning activities.

GOOD MAINTENANCE almost automatically implies a mutually helpful relationship between buyer and seller. Both must think in terms of cost per year rather than initial cost alone.

LET'S TAKE another example. Company *A* had been buying containers in large volume from Company *X* and *A* had a packaging development group quite active in its plant. A part of this group's time was spent on the design, testing, and reporting of new packaging ideas and techniques.

The leader of this team in Company *A's* plant had an approved project for the purchase of certain package testing equipment including a vibration machine. In the course of his interview with the plant purchasing agent, the sales representative of Company *X* learned of the proposed purchase.

Recognizing an opportunity, the sales representative suggested that his company be allowed to do the testing for Company *A*. His proposal was that his company make the sample packages, send them to Company *A* in their regular truck shipment and have the loaded sample packages returned in Company *X's* otherwise empty trucks for testing on Company *X's* equipment.

This vendor even offered to allow Company *A's* personnel, if so desired, to run the test on *X's* equipment. Needless to say, the offer of service was utilized for profit. Profit for both concerns in this case.

CONTROL LABS in many plants are constantly required to run routine analyses on incoming raw materials. Occasionally, because of the time involved in such analyses, cars are delayed in unloading. Frequently, savings are available by having the vendor run the analysis for you, giving you a report on each car shipped if desirable. If you have some pecu-

liar twist to your analysis, furnish the vendor a copy of your specifications.

In some instances, it may be that your method of analysis is unusual. Even in such an event, it is highly probable your supplier will be pleased to do the job for you as you want it done or as you have been doing it yourself.

METAL FABRICATION, materials handling, and process equipment offer challenging opportunities to utilize vendors' services for profit. For example, have your tanks and vessels fabricated from general specifications and sketches only. Your vendor will prepare detailed drawings for shop use and approval. Have such drawings prepared on your own tracing cloth. By utilizing your venders' services in this fashion, you will save materially on your drafting expenses, and you may get a better design.

THERE ARE OTHER FIELDS for cultivation. For instance, have you made full use of vendors' offers to serve you better by stocking in his own inventory items normally carried in your own stores with slow turnover?

Your store's inventory may include emergency items, normally of long delivery, which for protection you need to have on hand for instant call. It is expensive to tie money up in this sort of inventory not only from the standpoint of the cost of the material but also because of occupancy charges. Perhaps your supplier will be willing to stock such items for you.

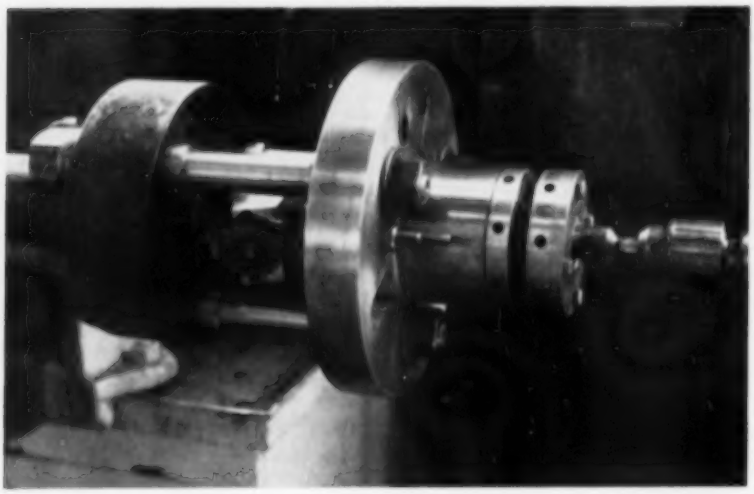
HAVE YOU ARRANGED TO reap the savings in your vendors' offers to reduce partial shipment and to withhold billings until an order is shipped complete? Everytime you process an invoice for payment an expense is being incurred. When you multiply this by the added work load in your receiving department and accounting department, a cost reduction worth trying for is easily recognized.

ARE YOU UTILIZING to the fullest extent your suppliers' offers to palletize or unitize incoming shipments? Materials handling represents an exceptional area for mutual effort by you and your vendor. Unit loading, the development of containers more suitable to your particular needs, even reusable containers are service functions you can develop with your supplier.

CAN YOU MAKE even more use of your suppliers' technical personnel and research facilities in solving mutual and related problems? When was the last time you had vendors' personnel helping you in your employee training programs? Think of such items as welding, painting and lubrication.

These and other areas offer an almost unlimited opportunity for real and material savings through utilizing vendors' services. Some are large with rewards easy to see, others are smaller with less noticeable returns. Use them all.

Remember, there is no soil bank program or acreage allotment provision restricting your endeavor. Your return will be in direct proportion to the crops you sow and how well you cultivate and nuture ideas. The opportunities are all around you for a good harvest.



Gasket Seats Refaced

A GREAT deal of high pressure pipe equipped with lens ring gaskets makes it necessary to reface the gasket seat on the pipe occasionally. Since the pipe is often quite long and bent into complex shapes, it is necessary to do this refacing in the field.

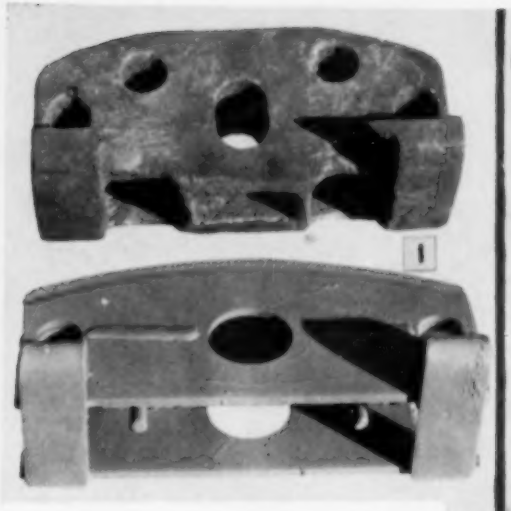
In order to expedite this operation, a portable facing tool was built as shown in the photograph.

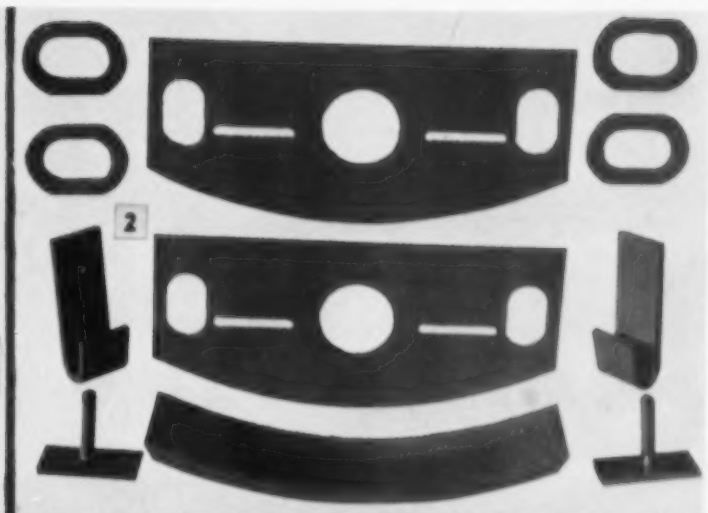
The tool consists of a mounting flange with shoulder studs to attach it to the pipe flange. A bearing housing is screwed into the mounting flange (3⅛" 8 thd) to provide tool adjustment, and locknuts provided for rigidity. The shaft is mounted on tapered roller bearings and driven by a 375 rpm air motor.

The cutting head consists of a screw housing, a tool holder fed by a screw and a star wheel attached to the screw. The star wheel hits a stationary dog each revolution causing the tool holder and its cutting tool to progress across the face of the pipe. The entire cutting head is mounted on the shaft at the proper angle for the gasket seat.

This tool enables us to set up and machine a piece of pipe in approximately 30 minutes compared to several hours by previous hand lapping or milling techniques, and one tool fits all sizes of pipe from ⅛" id to 4" id.

By B. J. WARREN, Maintenance Engineer, Carbide and Carbon Chemical Company, Texas City, Texas.





Welded Bumper Lasts Longer

By A. F. SANFORD
Sanford-Day Iron Works
Knoxville, Tennessee

APPLICATION of functional design principles and semi-automatic submerged arc or "Squirt" welding to the fabrication of a double-acting spring bumper for coal mine cars eliminated service failures, reduced weight by 63% and cost proportionately over a cast iron bumper.

Both versions are shown in Fig. 1. The castings, obviously having experienced considerable battering in service, is of 1.5% nickel iron and weighs 135 lb, even with the lightening effect of the cored holes. The two 3¼ in. square openings just inside the rear vertical bumping faces are to accommodate the double-acting spring assemblies, not shown in the illustrations. Frequent breakage of the castings was experienced in service.

The redesign in welded steel plate follows the contours and outer dimensions of its predecessor closely, but weighs only 50 lb. It is assembled and manually welded by the semi-automatic, submerged arc process on a bench setup, with labor clocked at only 48 minutes. Production is in lots of 200.

As will be noted from Fig. 2, the assembly consists of top and bottom plates, curved bumper face bar, two formed bump plates or straps, four hole reinforcing rings, two spring guide pins and two spring seat plates. The bumper face bar is formed from a sheared section of ⅝ in. plate, with ends beveled at 30 degrees as indicated. It is 18 in. wide, after forming to the 21 in. radius, and 5 in. deep.

All joints are tack welded and then completed by continuous fillet welds, 90¼ of the total footage being made with Lincoln Electric ML-2, semi-automatic machines, one being shown in action in Fig. 3.

Fig. 1—Coal mine car bumper of 1.5% nickel cast iron (above) weighed 135 lb. Welded plate (below) cut weight to 50 lb.

Fig. 2—The welded design is comprised of these basic components.

Fig. 3—Manual Lincolnweld "Squirt" welding of the spring bumper can be completed in only 48 minutes on this bench setup.

This is a good example of how schooled training in design for welding can be productive of a simple yet rugged weldment, light in weight and trim in appearance.

Planning and Standards . . . Reduce Accidents, Aid Maintenance

Electrical Hazards

By HERMAN GRANBERRY, Head
Mechanical Department, Research Division
West Point Manufacturing Company

SAFETY is a journey, not a destination. It is a continuing problem which changes as work or product changes.

Technical progress in manufacturing must be accompanied by progress in safety.

Safety is frequently looked upon as a separate department whose director is supposed to take care of everybody and, all too often, he gets all of the credit or at least an undue part of the credit when a department or the plant establishes a record for safe operation.

We certainly are not selling the safety director short, but most safety men will agree with me that a safety department has fulfilled its purpose only when safety, itself, is integrated into each job and into each man's work habits. Safety cannot be added to the product as it moves along the assembly line, as a spare tire is added to an automobile. Safety must be as much an integral a part of the product as work itself.

First, let us think about the plant and equipment and how the plant and equipment can be so designed as to make for safe operation and safe practices by the very nature of the equipment and the way in which it is installed. Then later we will come to the most important part by discussing the people who use the equipment and the practices and methods which they employ.

It can well be said that no piece of electrical equipment in itself is dangerous or constitutes a hazard unless a person is added to the picture. In other words, we are not concerned here with electrical equipment except as a means to an end and as it affects our lives. People are more important than things.

Many electricians put too much faith in such items as the National Electrical Code. They seem to feel that the simple instruction to wire it up according to "the code" is sufficient to assure good workmanship and safety.

This is definitely not the case. Let us read the preface of the code which clearly states:

> "This code contains basic minimum provisions considered necessary for safety. Compliance therewith and proper maintenance will result in an installation essentially free from hazard, but not necessarily efficient, convenient, or adequate for good service. This code is not intended as a design specification nor an instruction manual for untrained persons."

A good safety program uses the "code" as a starting point to build a set of standard procedures.

It is suggested that each plant establish its own procedures to insure the desired quality and safety of workmanship. By all means these standard procedures should be written down so each man has easy access to a copy. Why not give him a pocket notebook describing standard procedures?

Equipment

New plants or new installations should always be designed and installed in such a manner that all maintenance work can be done with ease and safety.

For example, the number of machines carried on branch feeders should be kept to a practical minimum so that if necessary the whole branch can be shut down without seriously impairing production. Some plants feel it necessary to ask electricians to replace circuit breakers or other equipment while the line is "hot." This is at best poor practice and all too

The author wishes to express his appreciation for the valuable technical assistance given him in preparation of this paper by Mr. C. R. Wesson, Master Mechanic of Lanett Mill, Lanett, Alabama, and Mr. Bruce Gray, Master Mechanic of Langdale Mill, Langdale, Alabama. It was presented at the Seventeenth Annual Southern Safety Conference.

often this "hot" wiring is too near structural steel or sprinklers or water lines so that a man does not have sufficient room in which to work safely.

The maintenance program itself should be considered in designing an electrical system within a manufacturing plant.

We all realize that it is not usually possible to tear down the plant we have and start again from scratch so that we can do all these things, so we must make the best of our present situation, however, it is the wise electrician who recognizes the faults of the present system and who has developed and designed an overall plan toward which he is working as he replaces portions of the outdated or unsafe circuits.

It is never wise to replace unsafe wiring with more unsafe wiring. It is always wise to standardize as much as possible on electrical equipment. This can be done best of all, of course, on a new job, but it can and should be done on any job.

For example, it is much easier to train a group of electricians to repair and service one brand or type of breaker than to teach them to repair and maintain a half dozen types. This is not to say that only one type of breaker should be used in a given plant, but each plant should set its own standards as to the breakers it considers most desirable for the given job and when new machinery is purchased the electrical department should have the opportunity of checking or specifying the electrical equipment and circuits.

Standardization of electrical equipment makes for better equipment and for ease of training new employees in servicing this equipment safely.

Many plants that have had trouble with fires originating in circuit breakers are solving this problem, or at least helping to solve it, by standardizing on type 1A Dust Proof Enclosures whenever possible. In some instances these enclosures are reported to be selling for the same price as the old standard enclosures.

In regard to starters it has often been found desirable to purchase this equipment with reset buttons located under the cover. All too often the production man is interested in keeping the machine running regardless of possible damage to the machine. Consequently, whenever an overload trips out he will merely push the button and start the machine again, rather than call the electrical department to see why the overload protection tripped. Such employees are less likely to open the cover and push the reset button and perhaps more likely to call the electrician for a stoppage due to an overload.

We could spend quite a bit of time discussing the relative merits of fuses and circuit breakers. Many engineers feel that they get better service and better protection from fuses in branch motor circuits, particularly on smaller motors such as 5 hp or less. Circuit breakers are generally agreed to be quite satisfactory in branch feeders and main feeders, but there are definite advantages from a safety and protective standpoint in using fuses for small or medium motors.

Each of us will agree that there is one best procedure for a given set of conditions. Our problem is to establish all of the facts, and then determine that one best procedure.

Some plants have had so much trouble with production personnel in combination with resistance type heaters in motor starters that they prefer the solder-pot type of motor protection device. Some production - minded employees have found that it is possible to take a screw driver and change the trip-out point on resistance type heaters so that the machine can be operated at a higher load than the heater would ordinarily permit. This practice is dangerous for both employee and machine.

A golden rule for electrical wiring installations states that, "each piece of equipment must have its own disconnect switch." This disconnect switch must be located as near the machine as practical and must always be in sight of the machine (never to exceed 50 feet). It should never be around the corner or behind a partition. Provisions should be made so each disconnect can be locked in the off position.

The protection device on a machine should not be the same as the on-and-off switch except perhaps in the case of very small motors. Frequent operation of on-off equipment will eventually cause it to fail.

Lightning arresters should always be installed on all lines between buildings if these lines are of any appreciable length. In fact, the longer lines should have lightning arresters at each end of the line. Care should be used in grounding the arrester—but good!

There are a number of good arguments in favor of installing a grounded neutral or grounded wye system on a new installation from a safety standpoint. But most plant electricians must operate their present system as safely as possible and seldom have the opportunity of specifying a completely new electric system. Special grounding transformers are available, however, for changeovers.

Each piece of electrical equipment should be protected by a ground wire of adequate capacity. This ground wire should be protected from mechanical damage. A ground wire which has been cut or broken is no protection.

Three-wire plugs for electrical hand tools are generally used and, of course, are a must from a safety standpoint. These, however, must always be kept in repair and the electrical system should always have a low resistance ground.

Plants should furnish all special tools and equipment that a man needs in order to do the job safely. Make-shift equipment almost invariably results in unsafe working conditions. The employee should not be expected to furnish special tools and equipment. They should be furnished and maintained in top operating condition by the company.

Many plants have had fire and electrical shocks resulting from the so-called "Greenfield" cable. This

The photograph shows left to right: R. C. Wesson, Master Mechanic, Lanett Mill, Lanett, Alabama; Herman Granberry, Head of the Mechanical Department, Research Division, Shawmut, Alabama; R. B. Gray, Master Mechanic of Langdale Mill, Langdale, Alabama (all are divisions of the West Point Manufacturing Company). The picture was made in the Electrical Department at Lanett Mill.

This large room is used for electrical repair and maintenance work as well as for use after hours as a class room. Each Tuesday night a class is held in which electrical theory and practical maintenance of mill equipment is taught by the chief electrician (James Carter). This is a valuable aid toward having a uniform maintenance on the various types of electrical equipment in the mill.

is being replaced, using three conductors with ground non-metallic flexible cord which has an oil resistant covering or sheath.

Wiring systems should be so designed to eliminate the possibility of condensate in conduits. This will reduce ground faults. Many plants must be operated under high humidity conditions that cause condensate or moisture in conduits, particularly when the conduit goes from one room to another or from a moist room underneath the floor and is exposed to outside temperatures. Some operators are finding that it is practical to seal the conduit ends in order to keep vapor from entering the conduit or to install the conduit in the floor instead of under it in order to prevent this condition.

Training and Procedures

Just as standardization of equipment makes for ease of maintenance and safety, the same can be said for standardization of procedures. The best way of doing a job should not, as a rule, be left to the judgment of individual workmen. The best way of doing the job should be decided before a man does the job and for routine jobs there should be a standard procedure which has been clearly set forth and in which each man has been thoroughly trained.

After the electrical equipment has been standardized and after the men have been instructed and trained in standard procedures, then certainly their tools and equipment should be standardized.

As mentioned above, the plant should furnish the larger items of special tools and equipment and in most cases the men will be expected to furnish certain other tools.

In some cases it is desirable that the company buy and stock standard tools that it recognizes and sell them to the men at cost.

This usually means that the men can save some money over buying the tools on the outside and the plant is more easily able to con-

trol the types of tools which the men use.

It is not enough to have standard tools and standard procedures. They must be made to work. This is done by the electrical supervision that has an established method of checking on both the men and their tools.

Each new employee must be considered a "green-horn" and be given thorough training. In this case the old saying is certainly true that "if you continue to assume, you will continue to blunder." The chief electrician must take full responsibility for his men and their safety. He cannot assume that they know the safe way of doing anything until they have been instructed and trained in that way.

Many electricians are dead today because they went out alone to do a dangerous job. An electrician's job is one in which the element of danger is always present. One of the best solutions to this is to use the "buddy" system. Any time a man is sent into a hazardous location or into an unfrequented area he should be accompanied by another electrician.

We all realize and agree as to the importance of training, tools and equipment—but each electrician must be convinced that he is his own safety director and that his life is in his own hands beyond a certain point. After his company has given him the best in equipment, tools, precedures and training, he still must take care of himself and protect his own life.

Along these lines it should be pointed out that no man must ever work on an electrical circuit that he has not checked personally to see that it is dead in all respects and, if it should ever become necessary to work on hot electrical circuits he should make his own tests and preparations.

The man should be made to rely upon himself rather than on some protective device which may fail and cost his life. For example, a man should not be taught to put a lot of faith in insulated screw drivers, rubber soled work shoes, rubber gloves, and other equipment in which one small flaw can cost his life.

There are many places where no electrical work should be done without a fire extinguisher at hand. This extinguisher should not be on the wall, but should be removed from its bracket and placed within arm's length of the electrician doing the work. This is the only way in which many flash fires could possibly be controlled. One spark from a defective breaker or circuit can start a severe fire in some departments. The electrician should be trained to believe and understand that usually there is something wrong or he would not be called to the job. He does not know exactly what is wrong, so he must be prepared for any eventuality.

When working on switch gear the disconnect should always be locked open and a low-resistance ground line connected so that if, by some accident, the line was thrown "on" it would blow. These ground lines also serve to protect a man from static electricity.

An electrician should be trained to respect a capacitor. He should respect the 3-minute delay time which is usually the time required for the capacitor to lose its charge through a grounding resistor, but this grounding resistor or its connection to the capacitor can and does sometimes fail so that the charge does not leak off the capacitor. This can result in a serious shock. Always test a circuit before working on it.

Physical fitness is a must if a man is to do a safe job as an electrician. If a man is to take his life in his hands we certainly should insist that he have a clear head and steady nerves. It is better to send a man home if he had a bad night the night before than to let him stay and work and take a chance of going home "in a box" or of sending someone else home in one.

Eyesight is most important. Bifocals are a definite handicap if a man must work on hot lines.

Clothing is, of course, usually supplied by the employee, but the chief electrician should insist that the clothing be safe. It should not be baggy or loose, yet should afford adequate protection to the person.

Many plants make a standard practice of tagging or locking switches in the off position. We have heard of one which made it a hard and fast rule that only the man that put the tag on the switch could take it off. Even the president of the company would not dare violate one of these tags and the story is told that one electrician was called out at 2:00 o'clock in the morning to take off the tag that he had put on the day before. Needless to say, the use of a lock is more positive protection than the use of a tag.

As was mentioned above, the electrician should be his own safety director and should be responsible for killing his own circuits before working on them, and he should certainly test a circuit after he kills it. Many people have been rudely surprised after they have "killed" a circuit only to find that it is still energized.

As a good general rule, starters should not be repaired while they are "hot." This is true because in high humidity locations a man is not safe even though he may be on a wood floor.

A three-wire plug for electrical hand tools is not sufficient protection in all cases. Some people put too much faith in the three-wire plug. If an electrical hand tool is used on a large sheet metal job or other such type of work a separate low resistance ground wire should be connected to the tool and the work because electricity follows the path of least resistance. This path may well be through the man rather than through the ground wire on the tool. This is particularly true on hot days when a man may be perspiring and in contact with a good ground.

Another point which should always be kept in mind on electrical tools is that they should be repaired only by qualified electricians. This was recently brought home to us in our own division because an ambitious young fellow had replaced a 3-wire plug on an electrical drill, but he was no electrician and had wired it up wrong so that the next man who used it on a grounded machine was almost killed.

The hazards of electronic equipment should be known and respected. Many people do not realize the high voltages and the

dangers that go with them in electronic equipment, even in the home TV set.

Elevators are a special problem and require special precautions when working on them. It is always a good idea to use the elevator operator himself as an assistant and certainly this is one place that the "buddy" system should always be used.

A good rule which cannot always be followed is that no electrical circuit should be worked while it is energized. Most management will agree that production is not really this important and they are more interested in the safety of their men than in a few minutes lost time. Preventive maintenance is a wonderful tool for preventing these breakdown jobs where it is necessary to do something in order to get the machine running again.

Too few people believe in and practice preventive maintenance. At a recent maintenance conference a young man in the maintenance department of one of the airlines was heard to ask "just what do you fellows mean by breakdown maintenance?" And yet —even airlines have accidents.

All electrical grounds should be checked and maintained. This is a form of preventive maintenance, it is most important that grounds be checked and maintained because a broken ground is worse than no ground at all.

Conclusions

Fredrick Taylor set forth the idea that there is a best way of doing any job, and with some flexibility that rule is being proved every day in industry.

Each of us will agree that for a given set of conditions there is one best overall answer. Our problem is to find all of the facts and then to decide on this best procedure.

Any supervisor will tell you that adhering to best procedures is no easy job.

The foregoing suggestions, of course, may give you some ideas and it is sincerely hoped that you will be able to take some of these to work with you and apply them, but these rules will certainly not answer all of the problems that arise on a job.

Supervisors have had to work out an answer to a problem more than once, answer the same questions dozens of times, and repeat rules many times.

Why, then, don't we standardize on the best answers when we find them? Let's write them down, relegate them to habit (or standard practice) and spend our time answering the more difficult or the new questions and problems.

There are, then, two simple rules which can be used to make the supervisor's job easier and will make the employee's job safer. These two rules are used in thousands of businesses today. If you are using them, then more power to you. If you are not using them, then please give them a fair trial.

THE FIRST RULE is to standardize on the one best way of doing a job. Remember that standards should be flexible and they merely represent the best way of doing a job as we know it now. Of course, there will be exceptions to standards but these exceptions should be rare and should be the responsibility of the man in charge of the job. Standards should not be set arbitrarily by one man. They should represent the combined best efforts and ideas of the group and, needless to say, if a man helps set a standard he will have more respect for it.

It may well be that the National Electrical Code will be the starting point for your standard. You may extract portions of it for your own use or you may state in your own standard the simple rules that cover problems which your electricians will encounter from day to day and then refer them to the National Electrical Code for all items not covered in your own standard.

THE SECOND RULE is to write it down. This is important, not only for your use and reference, but for the use and reference of the man on the job.

If your main standard practices are clearly and simply written into a small pocket-size book and each man on the job has one, then he has much less chance for misunderstandings or misinterpretations. This standard practice manual or handbook can be used as a textbook in training new employees.

Welding Seals Rivets and Seams

MORE THAN 12,000 ft of welds are required to circle each rivet and seal each seam in this 55,000 gallon oil storage tank. Eleven of these tanks at D-X Sunray refinery at Tulsa have been sealed in this way by S. R. Smith and Associates. Built in 1916 by the hot-rivet-and-sledge-hammer method, the tanks had recently begun to leak. After each tank was sandblasted and cleaned, the welding was carried out on three-shift operation, sometimes during 100 degree daytime temperatures.

Crank Shaft Ground in Place

Engine Vibration Stopped

By B. J. WARREN, Maintenance Engineer, Carbide and Carbon Chemical Company, Texas City, Texas.

CONTINUED vibration and engine grout failures made it necessary for us to install two power crank throw counterweights on some 1100 hp gas engine driven compressors. The installation of these counterweights required drilling and tapping 4 holes in the crankshaft for 1¾" 8 thread studs (see 1956 SPI annual maintenance issue). The installation also required filing or grinding the heel of the crankshaft flat and smooth to provide adequate bearing surface for the counterweights.

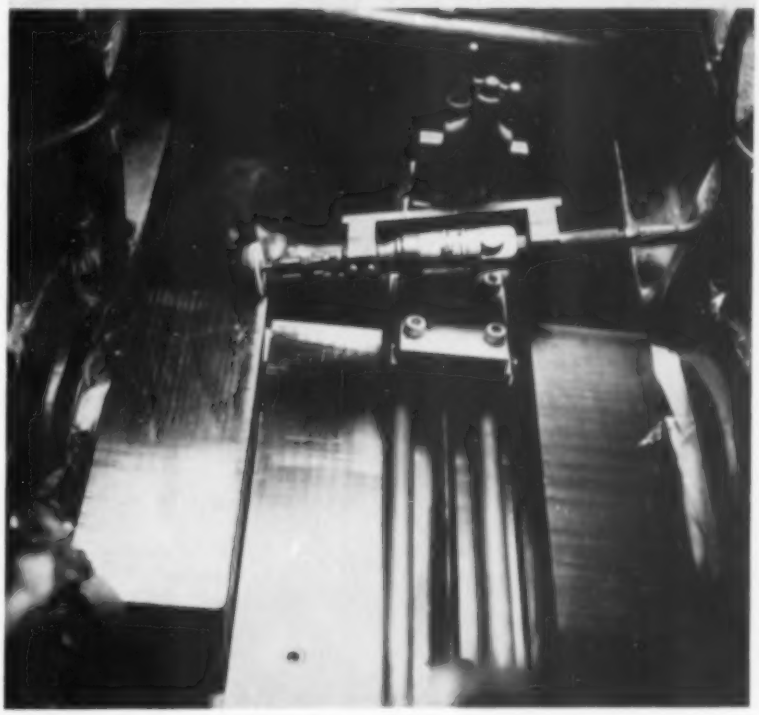
In order to do the job more accurately and more quickly, a portable surface grinder was built as shown in the photographs.

The grinder consists basically of a 20,000 rpm air grinder motor mounted on a small lathe compound. This was mounted on a sliding block which was traversed by a 300 rpm reversible air motor to provide constant speed. At the end of each stroke the sliding block was moved over ¼" (⅛ the wheel thickness) by the ratchet drive.

Due to our particular condition, it was necessary to purge the crankcase with an inert gas and operate the grinder from the outside through the side crankcase door.

By this method the grinder was set up and both heels ground in approximately 8 hours. A previous job done by filing required approximately 30 hours.

When the counterweights were installed a 0.001" feeler could not be inserted between the counterweight and the crankshaft at any point.



Upper view — Looking through side crankcase cover of compressor.

Lower view — Looking through cylinder hole of engine.

HANDLING EQUIPMENT CARE

By GLENN L. CORYELL, Engineering Consultant
National Coal Association, Washington, D. C.

HANDLING EQUIPMENT is subject to what may be classified as rugged or severe service. Such service is taken into consideration when the equipment is designed and built. Therefore, coal-handling equipment can be expected to be ruggedly built and capable of performing satisfactorily for a number of years. Nevertheless, regular and adequate maintenance procedures are essential to service-free performance of this equipment.

General Considerations

1. Lubrication. Because of the rugged design of most coal-handling equipment units many heavy duty bearings are used in their assembly. Such bearings require lubrication as do the bearings subject to lighter service. Some of these bearings may be the *sealed "lifetime" type*. These bearings, however, are not expected to last forever and should be included in any inspection and maintenance program.

Equally as important as an adequate lubrication schedule is the attention given to the specifications and condition of the lubricants used. The manufacturers recommendations must be followed in each instance, of course, as far as the specifications are concerned. The plant management, however, must assume with constant vigilance the responsibility of storing and handling all lubricants in a manner that will prevent contamination in any way. Probably more bearings are damaged each year from the use of contaminated lubricants than from infrequent lubrication.

2. Load Conditions. The life and service of coal-handling equipment can be adversely affected by any condition that places an overload or abnormal strain on its parts. Overload conditions may result from one or more of the following:

a. Feeding more coal to the unit than it was designed to handle.
b. Misalignment of operating parts.
c. Excessively tight chains and belts.
d. Foreign objects in with the coal.
e. Inadequate lubrication.
f. Defective parts.

3. Corrosion. The sulfur and moisture in coal can, of course, be reactive and set up certain corrosive conditions which will affect the parts of any coal-handling system with which it comes in contact. Where practical regular repaintings should be made using rust preventive coatings.

4. Motors and Reducers. The services to which these components of coal-handling systems are subjected are more or less common to their general application. Therefore, the manufacturer's standard maintenance instructions for each unit should be kept at hand and incorporated in the overall maintenance program. In general, however, a plant operator in his regular tours of duty should note the normal characteristic operating sound of each unit. Any deviation from this normal sound should incite an immediate check for its cause. The temperature of bearings and oil resevoirs should be checked by touch along with the necessary observations for insuring proper lubrication.

5. Drives. In the case of belt drives, the belts and sheaves must be kept clean. Oil is detrimental to natural rubber and V-belts. If such belts do become oily, remove and clean the belts and sheaves with a rag moistened with carbon-tetra-chloride. Do not use belt dressing on rubber and V-belts.

Belts should be replaced when they become frayed or cracked. In the case of multiple-drive V-belts, the usual recommendation is to replace the entire set with a new, matched set.

Frequent tension checks of belts should be made. Flat belts using idler pulleys have an automatic tension adjustment. The tension of other types of belts however must be adjusted as wear and stretching occurs. A properly adjusted belt has an "alive springiness" when thumped idle; an improperly tightened belt feels dead when thumped. Slapping and whipping of the belt during operation are evidence of improper tension.

Proper alignment of pulleys is essential for long belt life.

Most chain drives in common

use are of the roller type. These drives require little attention other than lubrication and cleaning. The tension of a chain drive need only to be sufficient to prevent the chain from rubbing on itself, its casing or other obstructions. In fact a slight looseness is desirable. Correct tension may be checked by determining whether the further removal of links is possible without making the chain taut.

The most important step in a preventive maintenance program for coal handling equipment is proper operation. Careless use of equipment is responsible for much damage.

Storage Yard Equipment

Improper operation of mobile equipment used in coal storage yards is especially likely. Constant attention to the operating practices listed below will reduce repairs and improve performance.

Conveyors, Stackers and Unloaders—Always start a conveyor before feeding coal to it from another unit.

Regulate the flow of coal to a conveyor carefully to prevent overloading. Select angle of gooseneck screen and height of boom to give desired screening and minimum drop of material at discharge point.

Do not leave the lower end of a conveyor buried in a coal pile overnight.

Move powered stacking and truck-loading units into a coal pile steadily and evenly and without forcing them.

Before putting a coal loader into operation, adjust the stop angle to prevent the boom from being lowered too far.

When loading use only the crowding speed or first gear. The higher speeds may be used, of course, in maneuvering the machine around the yard.

When moving a loader into a coal pile allow the boom foot end to slide on the ground to pick up coal. However, should some of the coal at the bottom be undesirable, raise the boom foot end to clear this coal.

Move into a pile with the flight line running and until the foot end is handling a sufficient amount of coal. When the pile caves in and suddenly overloads the unit, disengage the clutches. Should the cave-in be a large one, use the high reverse gear to move the unit quickly out of the pile.

In case of a car unloader a cover plate should be placed over the trough at the far end until the near side of the car is unloaded. Take care that lumps of coal do not bridge the space between the conveyor and the car.

Do not permit slack coal to build up in trough bottoms or corners, because it will cause flight and drag chains to climb and jump sprockets.

Do not leave portable unloaders in pits under cars unless pits are properly drained.

Always keep engines and motors covered when not in use.

Track or Truck Hopper—This equipment contains no moving parts other than the usual gate whose rack and pinion require lubrication. The structural steel components, the grating and hopper sides are subject to corrosion. When practical, exposed hoppers should be covered when not in

(Continued Next Page)

Old Building Rewired

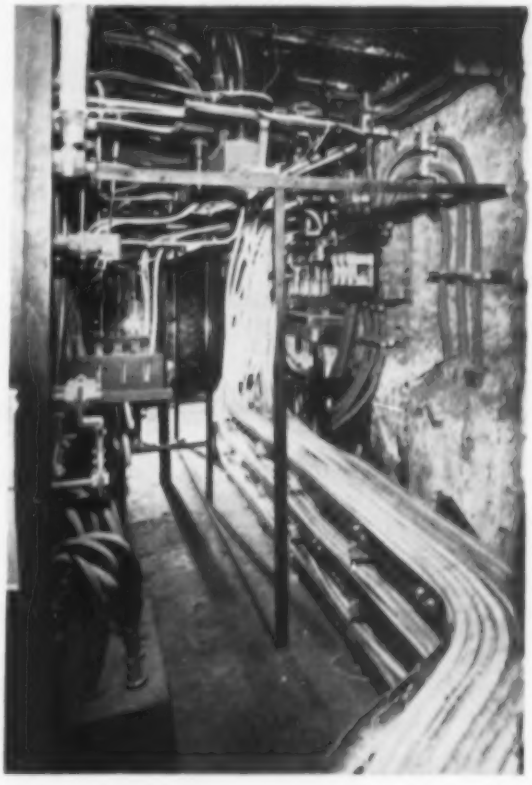
AWKWARD problems are faced by engineers and contractors when they must bring more cables into an older building, so that the greater demand for power can be met. Often such a building has very little space available for bringing the cables in to connect with the main switchboard or load distribution center. Recently a happy solution was found for a downtown department store.

Existing cables could not begin to handle the power loads demanded by modern lighting, elevators, escalators, and so on and a complete rehabilitation of the distribution system was necessary.

The 48 power cables are fed into the basement through aluminum conduit, but there was no room available to continue the conduit system inside the building.

The problem was solved neatly by installing three rows of Cope 12" width Expanded Metal Cable Trough. Continuous metallic contact between the two supporting systems is maintained through a box to which both systems are secured. The actual run of the trough is only 100 feet or so, at the end of which the cables are fed directly to the main bus duct and so into the main board.

The Company estimates that the use of cable trough saved at least 75% of the labor that would have been required had conduit been used. Various fittings, for example, were supplied by Cope to provide for turns around obstructions and to keep the cables stored neatly in a minimum space. Moreover the use of the cable trough requires so little space that all of the cables can be brought together at the same point at the switchboard.



use. It is also advisable to clean all coal from the hopper unless it is used every few days.

Feeders—In general, when feeders are used to regulate the flow of coal to the bucket elevator they are not easily accessible and servicing is likely to be neglected.

In the case of an *Apron Feeder*, the accumulation of fine coal that collects beneath the unit should be regularly removed. If this material is not removed, it will eventually build up to a point where the aprons will drag through the coal. This will subject the pans and chains to excessive wear.

Rollers and chains require regular lubrication. The overlapping heads of the aprons are fabricated with minimum clearances which must be maintained. Should the heads become distorted, hammer them back into shape or replace them. In a like manner pan ends should be checked, and repaired or replaced when distorted. Abnormal openings at head or end overlaps will permit leakage of coal dust onto moving parts and subject them to wear.

The troughs of *Flight Feeders* should be inspected for obstructions, high points at joints, or any other interferences. Such abnormal conditions may cause damage to the bar flights. Bar flights, when found bent, should be straightened and broken flights should be replaced. The chains should be inspected regularly and badly worn or damaged links replaced. It is important to keep the chain tension snug, but not tight. Gate operating mechanisms should be maintained in good working order and all sheaves and sprockets should be maintained in satisfactory alignment.

Bucket Elevators—Proper operation of bucket elevators is a prime requisite to long life. They should be started with the buckets empty. This means, of course, that they should be stopped *only* after all buckets are empty. Coal should be fed to the elevator at a uniform rate.

The chain tension should be kept snug with a minimum of backlash. Check the take-up frequently, especially when the chains are new. A new chain will get its initial stretch after handling about 400 to 500 tons.

There are two schools of thought on lubrication of elevator chains when slack coal is the material being handled. All agree that the chains need to be lubricated. However, most any practical lubrication procedure used is very likely to leave the outside surface of the chain covered with lubricant. This,

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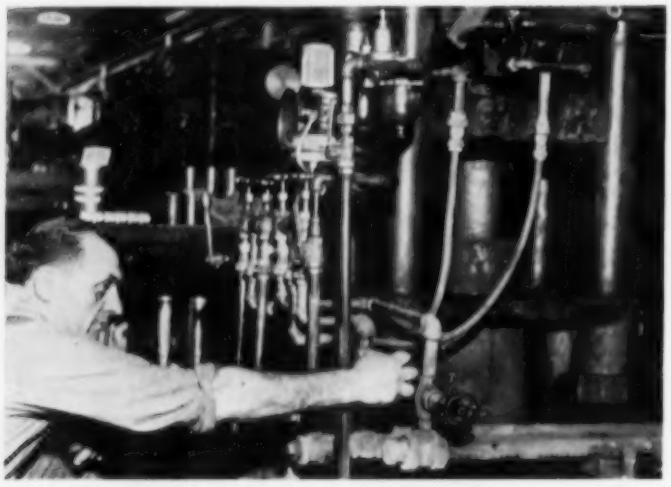


Quality Products Cut Maintenance

MAINTENANCE will become a more and more acute problem as plants become still more highly mechanized. In many industries where automation is already a big factor, the cost of maintenance labor actually exceeds the cost of production labor. At Du Pont's 1,000-acre Sabine River Works in Texas, 23% more maintenance men are employed than production men. Few companies have this high a ratio, but month by month, plant maintenance costs are creeping up in virtually every factory.

The same high labor costs that forced management to take production out of the workers' hands and put it into automatic processing are coming back to plague industry once again. This time, it's not the cost of making the product by hand — it's the cost of maintaining the equipment by hand. And the only solution in sight is one that's being heard again and again in management-level meetings these days: "buy the best equipment on the market."

Lunkenheimer cites an application at a General Electric Company plant as a case in point. A single bronze globe valve on a steam line requires opening and closing six times every day. The service is so severe that valves were failing every two weeks, on the average, even when they had case-hardened stainless steel or stellite-surfaced seats. The maintenance and repair costs, every few weeks, were amounting to double and triple the price of the valves G-E was buying.

Late in 1955, General Electric decided to test the Lunkenheimer LQ600 Valve on the line. They ran the test for more than a year, taking the valve off at four-month intervals to examine its patented Brinalloy seat and disc under a microscope. There were no failures, no leakage, and no signs of wear. The valve has already paid for itself more than 50 times over in mainteance savings and is still in the line.

Annual maintenance savings of 50 times the price of a quality product are exceptional—but the principle can be applied profitably in every plant.

in turn, will cause fine coal to stick to the chain, causing abrasion. Therefore, if the plant management does not allow sufficient time for oiling the barrel of each link with a squirt oiler, it is just as well that no lubrication of the chain be attempted.

Badly worn or damaged buckets should be replaced, and care should be taken in bolting them securely to the chain. Generally, it is advisable to prick-point the bolt threads at the nuts.

The elevator casing must be maintained plumb. This requires adequate bracing. The steel work should be painted to resist corrosion.

Bunkers and silos are frequently overlooked as points requiring attention. However, the complete emptying of bunkers and silos at regular intervals (depending upon the coal being used) should be a part of every plant maintenance program.

Metal bunkers are subject to corrosion and the liner material of lined bunkers can crack, chip off and otherwise deteriorate.

The metal tie bands of concrete stave silos should be kept painted as protection against corrosion.

From Bunkers to Boilers

Weight larries transport considerable weight. Therefore the larry tracks and supports should be inspected regularly and maintained in a safe condition. The larry hopper, chute and gate are subject to corrosion, of course, and should be inspected and maintained.

The motors and controls of motor-propelled larries should be maintained in accordance with the manufacturers' instructions. Current collectors and conductor rails should be kept clean and maintained to assure satisfactory electrical contact.

The safety device used to prevent the hopper of a weigh larry from falling in case of a failure of the scale rods should be checked regularly and all rollers, bearings, pivots and gears should be lubricated.

The parts or sub-assemblies of **coal scales** that require maintenance are the motor and drive, the several shaft bearings and the scale mechanism. As for lubrication, it is recommended that the manufacturers' instructions be followed carefully and completely.

The feeder conveying belt of coal scales should be inspected regularly and repaired or replaced before completely failing. Satisfactory performance of a coal scale is dependent on the free operation of the hopper discharge door. Its dumping and closing actions must not be impaired at any time.

Belt Conveyors are reliable and generally trouble-free, but require certain care to promote long service of the belt material and other components. Then too, the maintenance requirements of a belt con-

(*Continued on Next Page*)

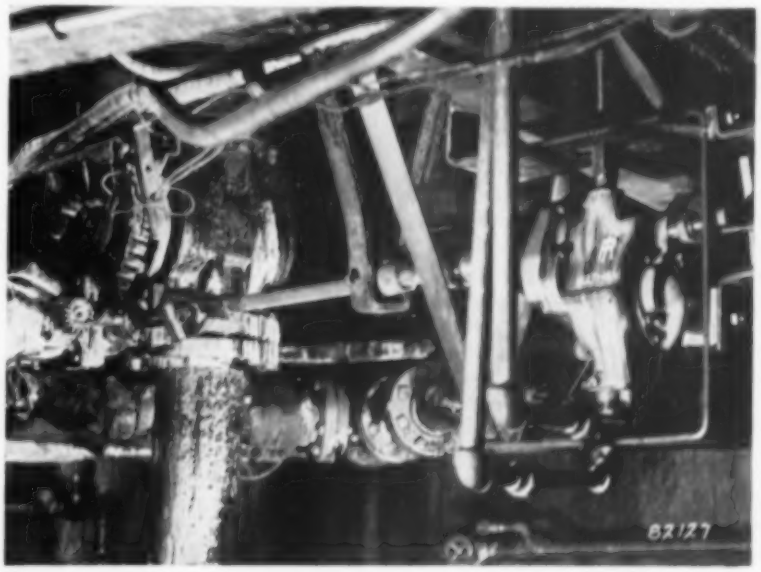
Air Motors Stand Moisture

DUMP VALVES on pulp digesters in a paper mill were opened and closed by one-horsepower electric motors, but the method proved unreliable because the electrical system frequently failed, due to the damp, steamy, atmosphere.

The digesters are huge kettles, 20 ft in diameter, 55 ft high. They operate continuously, stewing wood chips in chemicals. An operator located three floors above the valves at the pulp loading station controls the dump valves on the bottom of the digesters. Every 3½ hrs, at valve opening time, he used to blow a signal whistle. Then a crew of at least two men would run to the digester and stand by to operate the valve manually if the electrical system failed.

To solve the problem, four Ingersoll-Rand air motors replaced the four electric motors. Each air motor, with a 1" square drive, is held to the valve drive with a simple bracket. The side supports of the bracket are slotted to permit the motor to be moved back far enough so that the geared valve can be replaced, which is usually necessary twice yearly.

Each air motor is operated by remote control from the pulp loading station. A red and white signal light system indicates whether the valve is opened or closed. The air motors have been in operation for 4½ years without failure and the standby crew routine has been eliminated.



Coal Handling Equipment (Continued)

veyor can be affected by certain original design details and operational procedures.

The loading point, for example, requires careful attention in its design and during operation. Feeders supplying the conveyor should be regulated to provide uniform flow rate within its capacity. Generally speaking, it is desirable to load a belt to about 65% of its absolute limit when slack coal is conveyed.

The table shows maximum speeds recommended for various width belts.

Belt Width	Ft/Min.
12"	350
18"	400
24"	450
30"	500
36"	550
42"	600
48"	650

Belts, of course, are subject to a certain amount of abrasion as when the material slides on the belt at the loading point. Also, when gritty material clings to the belt cover, it will grind the belt as it passes over the snub pulleys and return rollers.

Rubber belting is especially vulnerable to oil. Do not permit oil or grease to drop on the belt.

A loaded belt conveyor will always sag between the carriers. The amount of the sag will depend on the weight of the belt and its load, the tension on the belt and the space between the carriers. The greater the sag, the greater the flexing of the belt as it passes each carrier and idler. Sag increases the power requirement and wear on the belt. It is advisable to maintain the minimum sag practical for the tension limit of the belting material used. When screw-type takeups are used, they should be adjusted frequently to compensate for the affects of atmospheric variations.

Cuts in the cover and any other damage to the belt should be immediately repaired. In case of surface cuts, a special gum or rubber dough can be used as a filler. On the other hand, long cuts may require vulcanizing. Under certain circumstances long tears running in the direction of the belt length can be repaired with metal fasteners.

Idlers need to be lubricated regularly and the following items checked:

1. All rolls should turn freely and smoothly but with no excessive end play.
2. See that all rolls are properly seated and held in brackets.
3. Check for any unusual wear or damage to rolls, brackets or base.
4. In checking the lubrication a thin head of grease around the final opening of each seal of the antifriction bearings, indicates adequate lubrication.
5. Check for accumulation of material under rolls.
6. Check for any build-up of material on return belt rollers.
7. See that self-aligning idlers operate freely.
8. Check belt scraper and cleaner for alignment.

Head pulleys should be checked for centering and alignment as well as belt slippage. Takeup pulleys must be kept in proper alignment. Foot shafts need to be kept carefully aligned to insure proper training of the belt and all shaft bearings should be lubricated regularly.

Screw Conveyor maintenance, other than the usual care of drives and bearings, is mainly governed by operating conditions.

The life of a screw conveyor is largely determined at the time of its design and the design item that is most important to its life is the loading factor or the per cent of the cross section of the trough occupied by the coal being conveyed. In the case of slack coal, a loading of 25% of the pipe opening is desirable with 30% as the maximum. Therefore, careful attention must be given to the operation of the feeding arrangement used to meter the coal to the screw conveyor at its loading point.

The important thing to keep in mind is that the abrasive action of coal on the screw and trough and the torque requirements of a screw conveyor increase rapidly as the per cent of loading exceeds the optimum values.

The speed of screw conveyors is important. The table shows the maximum recommended speeds for various sizes. Slower speeds will generally justify any increased cost because of increased operating life.

Screw Dia.	R.P.M.
6"	120
9"	110
10"	100
12"	95
14"	90
16"	85
18"	80

Another factor affecting the torque and power requirements and life of a screw conveyor is the alignment of the equipment. Joints in the screw assembly do not take universal action without the life of the joint being affected. Therefore, rubbing between the screw and housing should be corrected.

Screw conveyors are protected against overload and jamming that may result if a foreign object jams its mechanism. If a shear-pin breaks or another type of an overload device throws out, the cause of the overload should be determined and corrected before starting the conveyor. In any event, do not eliminate the overload protective feature by using a stronger shear-pin or by some other means.

Summary

The following lists high points of the recommendations previously covered:

1. A regular program be followed in the lubrication and careful attention given to the storing and handling of all lubricants to prevent their contamination.

2. All equipment be designed, coordinated and operated to maintain loading conditions within the design limits.

3. Maintain alignment and other operating conditions as required to minimize power requirements and related excessive strain conditions.

4. An inspection program of all functional parts so that wear and operation conditions can be noted and repairs or replacements made before complete failure.

5. The manufacturers' recommendations followed in the operation and maintenance of the individual components.

The array of equipment at left is required to make a bell and spigot joint in an alloy cast iron drainage line.

Only a can of cement and a brush are needed to join PVC pipe and a PVC socket type drainage fitting.

PVC Piping

New Materials Cut Cost Draining Corrosive Liquids

SPENT ACIDS and other liquid wastes of industry are being drawn off more economically through polyvinyl chloride piping in many industrial processes. There are a growing number of installations in general manufacturing, chemical, drug, beverage, and food plants.

Nine Reasons

Carl B. McLaughlin, executive vice president of Tube Turns Plastics, Inc., gives ten reasons for industry's use of PVC drainage piping:

1. PVC pipe and fittings cost less. A 4' length of Schedule 40 alloy cast iron pipe in the 2" size, for example, sells for about $14.50. A 4' length of Schedule 40 PVC pipe in the same size is priced at $3.74. Also most PVC fittings cost less.

2. Less labor per joint. Recently a journeyman plumber was timed as he made a bell and spigot joint in a 2" Schedule 40 alloy cast iron line. It took him three minutes and 45 seconds. Then he was asked to join a length of 2" Schedule 40 PVC pipe to a PVC socket type drainage fitting. He was finished with the job in 56 seconds.

3. Fewer tools and materials are needed. (See photographs.)

4. Fewer joints are required. The Schedule 40 alloy cast iron pipe often employed in low pressure drainage installations comes in relatively short lengths, up to 5' in the 4" size, while most commercial sizes of Schedule 40 polyvinyl chloride pipe are readily available in 10' and 20' lengths.

5. Useless deadweight is eliminated.

6. There are no losses due to breakage. The brittleness of alloy cast iron and ceramic pipe and fittings results in breakage as high as 10% between the factory and the job. PVC pipe and fittings have high impact strength and no allowance must be made for damage under normal circumstances.

7. In PVC lines that employ the new socket type drainage fitting the bore at the joints is smooth and sanitary. Not only is crevice corrosion avoided, but optimum flow conditions prevail as well. PVC pipe joints are durable.

8. PVC piping is unaffected by ground conditions, whether acid or alkaline, wet or dry.

9. PVC piping is not subject to galvanic or electrolytic action.

Photos and data, courtesy Tube Turns Plastics, Inc., Louisville, Kentucky.

Mississippi Company Controls Algae and Fungus in Cooling Tower

PENTACHLOROPHENATE

By GEORGE E. BURGUET
Mississippi Power & Light Company
Jackson, Mississippi

REX BROWN Steam Electric Station of Mississippi Power and Light Company has condensing water cooled by redwood cooling towers. The plant's three units have a total capability of 155 mw —each with its own separate cooling tower.

The plant's first experience with chlorine was on the largest tower, a 50,000 gpm mechanical induced draft tower with a heat transfer of 442,000,000 Btu per hour. This tower has 12 cells with one fan per cell serving a 66 mw unit. Liquid chlorine was fed to the tower to eliminate the slime and green algae formed on the wood surface.

The algae attack was generally limited to the wet area on the periphery of the tower's structure. Sunshine being one of the principle requirements to the life of green algae, the tower's outside structural members and louvres were usually well covered with green algae.

Chlorine was injected into the suction of the circulating water pump with a commercial chlorinator as commonly practiced in most power plants. A continuous feed of liquid chlorine of approximately 150 pounds per 24 hours was maintained part of the time, and from time to time the tower was shock treated to as high as 450 pounds per 24 hours. This produced a chlorine residual of .5 to .8 ppm as tested on the condenser outlet.

The usual consumption was 15 to 18, 150 pound cylinders per month. At this rate, the total chemical cost disregarding the cost of feeding equipment, pumping, water, etc., is estimated at approximately $3,000 per year. This does not include return freight on empty chlorine cylinders.

Although medium protection against algae was evident, some serious concern was given to the possibility of fungus attack. This concern was well founded since in 1955 the complete fill of this tower, approximately 92,000 board feet of heart redwood lumber with only 5 years of service, collapsed and had to be replaced.

Opinions varied as to whether the early fill collapse was due to fungal attack or to chemical attack by the water. It was realized that delignification was taking place in the tower due to the high alkalinity of the water and this could cause a great deal of chemical attack. However, it was also realized that chemical attack weakens the natural toxicity of redwood towards fungus, therefore thought was given to chemical conditioning the water to reduce its alkalinity and also a treatment and/or pre-treatment to the new and existing tower lumber.

It was decided then to (a) pretreat the new fill with creosote (b) treat the water with concentrated sulfuric acid to reduce its total alkalinity and thus, its tendency towards delignification and (c)

Rex Brown Power Station cooling tower on the right

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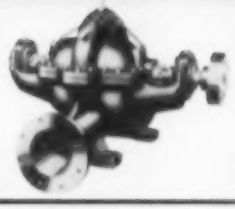

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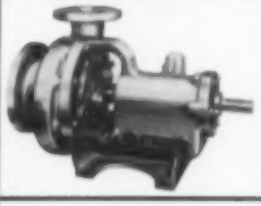

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America's broadest line of economical, general purpose pumps. Horsepower range from ¼ to 150. Head range to 260 ft. Capacities up to 5500 gpm. Easy to buy, apply, install and maintain. Tens of thousands in use.

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2,3,4 and 5-stage designs for supplying, circulating and boosting water and other liquids in moderate capacities against medium and high heads. Durable and dependable in operation. Heads up to 1660 feet; capacities up to 3000 gpm.

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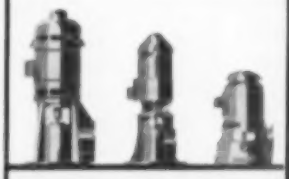

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Cooling Tower Maintenance (Continued)

protect the existing and new lumber of the tower from fungus attack with a fungicide.

Several preparations on the market offered a combination of pentachorophenate with solubilizers and dispersants which claim good fungicidal and algacide action. It was decided to begin feeding this type of chemical in shock treatments of 300 ppm every two months.

After the second treatment, the tower looked clear of algae and even the surface on the outside sheeting where slight water leakage created a propitious place for algae and slime growth, small spots of algae growth had cleared. The next treatment was given two months later as a preventive measure since the tower still had the two hottest summer months to endure.

The cold days of winter, of course, delayed the fourth treatment for six months. Algae growth at the time this was written (Feb.) did not warrant a treatment. Total yearly expenses were, at $33.00 per hundred pounds of chemical and a total of three treatments of 1,350 pounds each, $1,400.

It was known from visual inspection that pentachlorophenate was providing good algae protection, however, it has also been proved at another plant, that it was giving some protection against fungus. This occurred when test by impartial investigators disclosed that an identical tower at another location was infected by fungus and the same 300 ppm pentachlorophenate shock treatment was used. On the first treatment, culture test proved that part of this condition had been obviated. Since then this second tower has had a second treatment and a second fungus culture test will be made.

In conclusion, comparison of chlorine against pentachlorophenate is made as follows:

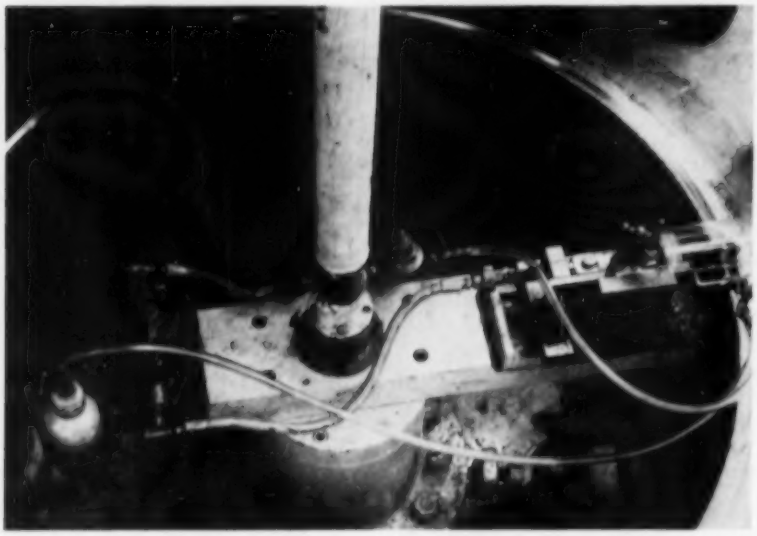
1. Total chemical required per year was less by approximately $1,500 than chlorine.
2. Besides actual elimination of the algae, protection against fungus is eminent.
3. Man-hours required for maintenance of chlorinator and handling, and purchasing of chlorine cylinders, is eliminated.
4. Although pentachlorophenate is poisonous, liquid chlorine as used in this type of installation, is a more dangerous hazard to personnel.
5. No capital investment necessary in feeding equipment. The pentachlorophenate is merely fed three, four, or five times a year depending on tower demand, size, etc., by dumping the chemical into the basin of the tower before the pump screens.
6. Cost of chlorine per 100 lb $11.71.

Cost of feeding chlorine to No. 3 tower per year $3,792.00.

Cost of pentachlorophenate preparation at 1,400 lb each treatment $1,386.00.

Difference in favor of Penta based on 12 months of CI_2 feed $2,406.00.

Difference in favor of Penta based on 8 months of CI_2 feed $1,142.00.



Gasket Groove Machined

CONTINUED corrosion and hand polishing on a high pressure vessel equipped with a delta type gasket required that the gasket groove be remachined to remove corrosion pits and to return the groove to its original shape and surface condition. Due to the size of the vessel it was almost impossible to take it to a shop; so a portable grinder was designed and built to do the job as shown in the photograph.

The grinder consists of a mounting table mounted in the vessel with 8 lugs. A bearing housing and shaft is bolted to this table with adjusting screws for alignment. An arm is bolted to the bearing housing and a 20,000 rpm grinder is attached to a small lathe compound on the arm.

The grinding wheel is dressed to the proper shape on the grinder by the arrangement shown. The arm is rotated with a gear motor at ½ rpm through an automobile drive shaft.

Approximately 8 hours are required to transport the apparatus to the vessel, set up and align it to the groove within ± .0005". Subsequent grinding time depends upon the amount of metal to be removed.

This apparatus is now used in place of hand polishing at each assembly in order to save time.

By E. C. PAULS, Carbide and Carbon Chemical Company, Texas City, Texas.

■ The 16,000 users of YARWAY Blow-Off Valves include utilities, industrial plants, institutions and government installations—well-known plants and plants you've never heard of; large plants, small plants; with boilers of every pressure rating.

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YARWAY **STEAM PLANT EQUIPMENT**

No Longer a Major Repair Job

How to Install Split Seals

SPLIT SEALS have so simplified the bearing seal problem that oil seal installations are reduced from a major repair job to a simple, inexpensive operation. The split type seal can be applied in a fraction of the total time required for the installation of an ordinary solid type seal with a proportionate savings in labor cost.

The Garlock Packing Company recommends several suggestions on the proper installation of split seals. Improper application to bearing-mounted shafts carrying couplings, gears, sprockets or fly wheels can result in extensive wear, overheating, warping, vibration and machine downtime. Garlock recommends that split seal installation should be accomplished with the following steps:

Split-Klozure oil seal showing the spring steel fingers that maintain even pressure on the lip of the seal.

1) See that recess is thoroughly cleaned and that all burrs and sharp cutting edges are removed.

2) Apply grease or oil to the shaft.

3) Place the split seal around the shaft at points near the recess into which it is to be installed.

4) Start the sealing element into the recess at the top side of the housing by lining up the sealing lip on both sides of the joint and inserting by compressing the leading edge of the Split-Klozure to enter the housing. (See Fig. A)

5) Continue this process around the entire periphery of the shaft until the sealing element is inserted in the recess. (See Fig. B)

6) Seat the element in the recess (See Fig. C) by tapping lightly with a hammer or block of wood, using care to prevent damage to the lip.

7) Apply cover plate, bolting tightly into position, to compress the seal into the recess. The cover plate should be sufficiently heavy to compress the sealing element firmly in the recess. Screws or bolts should be as near as possible to the recess bore to prevent the cover plate from dishing. (See Fig. C)

8) When the spilt seal replaces a solid oil seal, the recess depth may be greater than the thickness of the replacement seal. A filler gasket is recommended to fill out the recess although a split metal washer may be used for this purpose.

9) When a split seal is installed in the end of a plain or sleeve bearing, a drain or vent should enter the space between the seal and the bearing to prevent pressure from building up at this point.

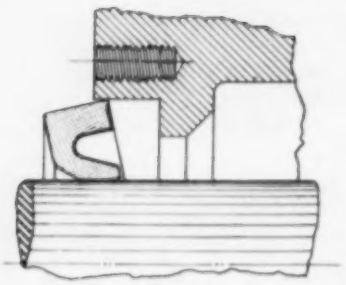


Fig. A

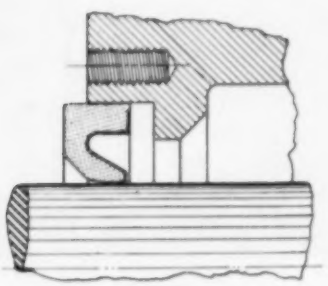


Fig. B

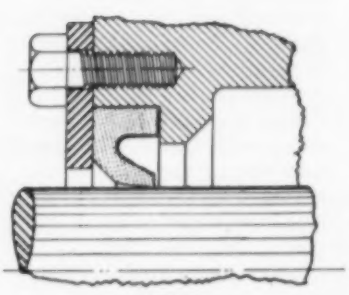


Fig. C

If You Operate a Cooling Tower, Think about July – Now

Maintenance of Speed Reducers

By JOHN E. KING
Manager, Service Department
The Marley Company

PLANNED preventive maintenance applied at this time can assure peak performance of the cooling tower during the crucial period when the wet bulb temperature reaches its peak.

Inspection, to be thorough, must include structure, distribution system and basin, but the most important point is the mechanical equipment. The speed reducer is the very heart of the tower and since it is subject to greatest service wear, it warrants most careful maintenance.

Speed Reducer Design

The power input shaft is held in place, within the pinion cage, by a set of roller bearings. The output shaft, or fan axle shaft, is at right-angles to the input shaft and it, likewise, is held in position by roller bearings.

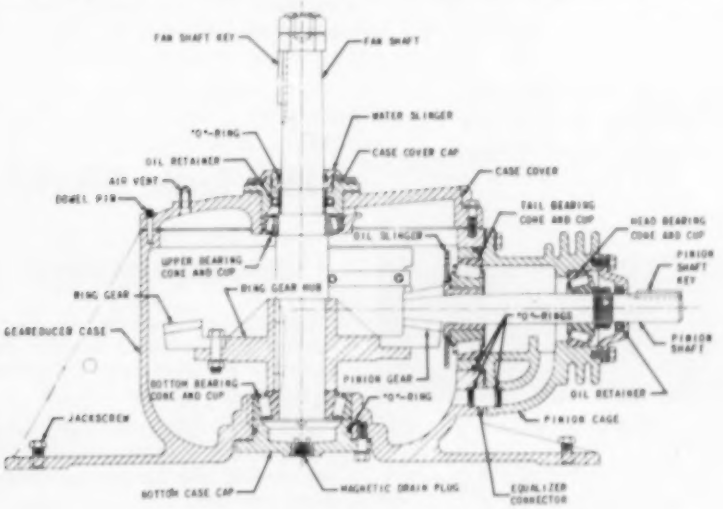
The gears within this unit can be either a single stage reduction set or a two-stage reduction set. Gears can be worm, spiral bevel, hypoid, helical or a combination of these.

How to Look for Wear

Wear will develop in the bearings and where the gear teeth make contact. Wear in the pinion shaft bearings can be detected by movement of the pinion shaft within the pinion cage.

Disconnect your drive shaft and see if you can move the pinion shaft, either in and out cage or sideways in the pinion cage. Usually, the pinion shaft bearings are so set that there is a slight preload on the roller bearings. Therefore, any movement of the pinion shaft indicates wear of the roller bearings. If movement is detected, the pinion cage should be romoved from the unit and the bearings inspected. They should be replaced if damaged or severely worn.

Cross-section of typical industrial cooling tower speed reducer.



The bearings on the fan axle shaft can be checked for wear by moving a fan blade up and down, and observing the movement of the fan axle shaft with reference to the top of the speed reducer casting. Relative movement of this shaft should be slight. Check the manufacturer for recommendations. Any movement beyond prescribed limits indicates wear on the fan axle shaft bearings. In the event that you find excessive movement at this point, the speed reducer should be opened and these bearings inspected.

Excessive wear of the gears themselves, can be determined by measurement of the backlash or movement of one of the shafts with the other shaft locked in position. The allowable backlash varies and the limits should be checked with the manufacturer. Excessive backlash indicates wearing of the teeth and bearings. Inspect and replace parts showing excessive wear.

The speed reducer must operate as a unit. Excessive wear at any one point may impose excess loads on other parts. In other words, excessive wear of the pinion shaft bearings can result in excessive loads on the gear teeth. Excessive wear on the fan axle shaft bearings will impose more load on the pinion bearings and gear teeth. Excessive wear or excessive loads on the gear teeth will in turn impose excessive loads on the various bearings. Keep the unit well adjusted and loads will fall within design limitations.

Speed reducer manufacturers have complete instructions concerning proper operating conditions and field repair; many have

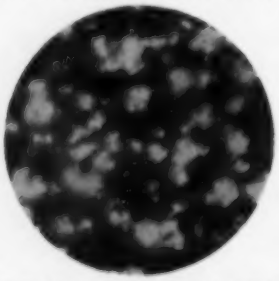
(Continued on Next Page)

HOW SUBOX PAINTS ACTIVELY COMBAT CORROSION

Subox paints go far beyond the passive protection of inert paints. The chemically-active suboxide of lead in Subox paints actually works continuously to combat corrosion, as illustrated by these photomicrographs:

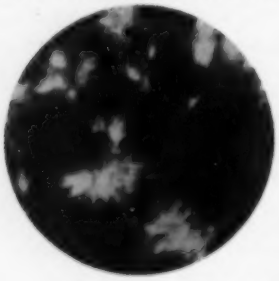
LEAD-SUBOXIDE PARTICLES

Lead-suboxide is a colloidal pigment which assures maximum penetration of a surface . . . packs to form a dense, impervious film. Two coats of Subox usually give the coverage of three of other paints . . . often, one coat of Subox is enough.



FIELD OF LEAD SOAPS

As soon as Subox is dry, lead-suboxide begins to react with the fatty acids of the vehicle to form insoluble lead soaps whose fibers bear metallic lead. These fibers intertwine to continuously build up a reinforcing film of protection.



FIBROUS STRUCTURE OF LEAD SOAPS

The fibrous film gradually strengthens and replaces the original vehicle film which otherwise would have become brittle and have largely lost its protective power and adhesion.

Subox paints are the only American paints made with lead-suboxide. They are economical to apply, endure for years and largely eliminate the need for scraping and repriming when repainting is required.

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Subox Inc.

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6 Fairmount Plant
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prearranged overhaul or replacement plans.

Lubrication

It is easy for moisture to contaminate the lubricant in the gear case on a cooling tower. Any time that this lubricant becomes contaminated, it should be completely drained, the case flushed out with high quality flushing oil and the lubricant replaced.

There are at least two oil seals in each speed reducer unit, one on the pinion shaft and one on the fan axle shaft. These seals must function properly, in order to avoid excessive loss of lubricant.

When inspecting the unit, pay particular attention to evidence of oil leak at the point where the pinion shaft enters the pinion cage and at the point where the fan axle shaft comes through the gear case. If evidence of oil leakage is discovered, the unit should be disassembled and the seals inspected, and replaced if required.

The lubricant must be carried at the proper operating level. Some speed reducers are lubricated by a splash system, some by a pump system. In either case, low oil can result in damage to the unit.

The lubricant should be inspected at least once a week for proper operating level, and once a month for contamination. The lubricant should be changed every 3,000 hours of operation or every six months, whichever occurs first. Use only the lubricant recommended by the speed reducer manufacturer.

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Tabulation (by state and city) is published as a special service to plant engineering and purchasing department personnel.

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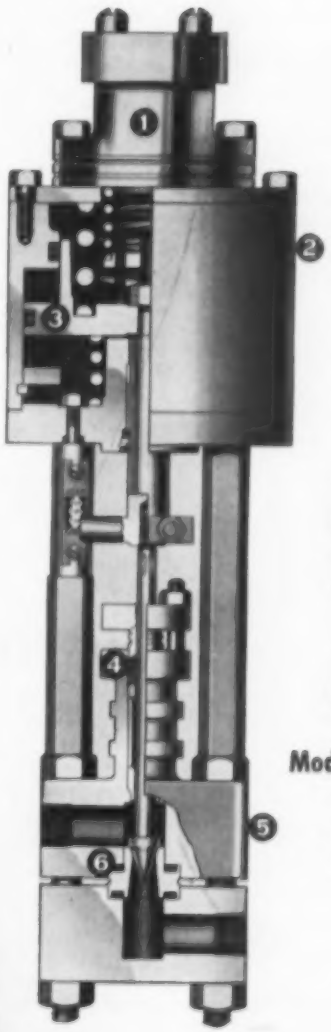

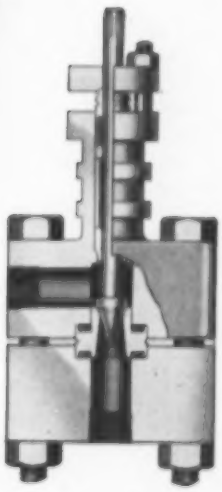

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Today's Electrical Distribution Equipment Demands Planned Maintenance

Continuous Kilowatts

H. E. HEDDESHEIMER, Consultant-Electrical Engineering, Plant Engineering and Maintenance Services, General Electric Company, presented the paper from which this article is abstracted at the 8th Plant Maintenance and Engineering Conference and Show at Cleveland.

OUTAGE on one of the least significant feeders can disrupt the production-line type of manufacture as badly as a total plant power outage — especially in automated operations.

Automation "boils down" to this—it is the technique of utilizing motors, air, water, etc., to accomplish operations that were previously done by hand. As this automatizing develops to its ultimate, machines naturally become more and more complex, and as one of the large automatic machine builders put it, "We must assume the power supply is continuous. We have enough problems trying to make the mechanical parts of our machine function properly."

We *will* discuss some of the inspections and preventive maintenance techniques that we can utilize to reduce to a minimum the number of failures of our distribution system.

Capacitors

Capacitors usually have an internal discharge resistor to reduce the voltage to 50 volts within five minutes after the capacitor is de-energized. However, it is still a *must* that each terminal and the case be grounded by use of a grounding stick whenever work is to be done on or near the capacitor. This ground connection should be maintained all during the inspection, maintenance, and cleaning of the capacitor.

Capacitors furnish reactive current through the reactance of the circuit, and the voltage at the point of the capacitor is increased. Incorporated into the design of any good power factor correcting capacitor is the ability to operate continuously at 10% overvoltage; however, any voltage higher than that will cause overheating, shorten the life of the capacitor and blow fuses due to excessive current drain. This situation is usually corrected by switching the capacitors out of the circuit (either by hand or automatically) during light load, high voltage periods.

Fuse blowing might also be caused by a short inside the capacitor, gradual weakening of the fuses due to sustained overloads, heat or corrosion, or high voltage transient switching; however, these causes are the exception rather than the rule.

Another cause of capacitor trouble is operation at excessive temperatures. 55C for most power factor capacitors is the upper limit, and any temperature in excess of this will cause deterioration of the dielectric and increase the losses well beyond the normal 1/3 of 1%. Continued overheating usually results in internal breakdown.

Excessive operating temperatures are caused by two things, either excessive voltage or poor ventilation. Once again, the excessive voltage is best corrected by switching. If it is suspected that the overheating is caused by poor ventilation, move the capacitors to a location on the line with a lower ambient temperature, or provide forced ventilation, or in the case of multiple capacitor installations, increase the spacing between capacitors and install baffles to prevent heated air from convecting to adjacent capacitors.

In order to realize the best efficiency, long life, and stable operation of your capacitors, you should establish a program for preventive maintenance as follows:

Check for blown fuses every 6 months; a capacitor in the system with a blown fuse is investment without return.

Clean the capacitor tank and bushing every 6 months, or more frequently if the capacitor is located in an extremely dirty location. Check the operating temperature by fastening a thermometer to the side of the can. A thin layer of dirt will greatly decrease the heat dissipating ability of the can. Extreme dirt on the bushings might be the cause for leakage or flashover.

When newly installed capacitors are initially energized, the voltage should be checked. Allow about 6 to 8 hours for the capacitors to reach their operating temperature and choose a low load period. Further voltage checks should be made whenever there are any major load decreases on the system or a power transformer tap is changed.

High-Voltage Bushings

As with the capacitors, high voltage bushings should be de-energized before inspecting, cleaning, or testing and a ground attached to remove any electrostatic

charges. Also, a foolproof safety tag or lock system must be set up to insure that there are no feedbacks on the circuit on which the work is being performed.

The most important part of bushing maintenance is a periodic cleaning of the porcelain. This is especially true of any indoor installations where the bushings do not receive the benefit of an occasional washing by rain and are usually designed with a lower flashover value. The frequency of the cleaning depends entirely on local conditions; usually every six months is sufficient.

The dirt deposits, which under humid conditions may cause flashovers, may be removed by cleaning with a cloth and ammonia and water solution. For heavy accumulations of dirt and grease, a porcelairf cleaning powder such as lockbrite may be necessary.

After the bushing has been thoroughly cleaned, it should be inspected for chipped petticoats, fractured porcelain, leaking gaskets, and the condition of the metal parts.

If a chipped place is found on the porcelain petticoat, it should be hand-honed smooth, then painted with two or three coats of a good sealer, such as G. E. Glyptol No. 1210. The purpose of the sealer is to give a glossy finish and help prevent the accumulation of dirt.

If the porcelain is found fractured, it must be replaced. Fracturing is usually caused by a rigid bus connection without a flexible connection to allow for normal thermal expansion and contraction, or by uneven tightening of the clamping ring bolts.

If the surface of the cement is found crumbled or chipped, it should be refinished with patching plaster and painted with a good sealer.

Any metal parts which are corroded should be cleaned, primed, and repainted.

The oil level of oil-filled bushings should be checked, and occasionally a sample of the oil taken and tested for its dielectric strength.

Tests can be made to determine the dielectric condition of the bushing; however, this is usually

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Electrical Distribution (Continued)

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Cable

If a preventive maintenance procedure has not been established in your plant for the cable in your distribution system, the first thing to do is to visually inspect all your circuits for overloads, poor thermal conditions, mechanical damage and inherent danger spots.

A check for overload conditions can readily be made by use of a hook-on ammeter. This is a fast, fairly accurate method and eliminates the necessity of disturbing the connections or de-energizing the feeder.

The two most common causes for cable insulation failure are moisture or excessive heating. Excessive heating caused either by overloads or the presence of external heat sources will cause increased dielectric losses and eventually, due to drying of the insulation, produce cracks which lead to ultimate failure.

If the cable has been exposed to excessive temperatures for a long period of time, the insulation has probably become brittle. This cable should not be disturbed until replacement cable is on hand and a shutdown can be coordinated with production. If it is disturbed, the insulation will probably crumble and cause an immediate failure.

After the trouble spots have been determined and corrections made, a yearly schedule should be established for D.C. high potential test or megohmmeter readings. Most plants find it difficult to justify the cost of a D.C. Hipot set, and therefore, megohmmeters are widely used. Since readings have to be taken for up to 10 minutes, an electronic or motor-driven megohmmeter is mandatory.

The first time the megohm readings are taken on your cables, in all probability the readings will mean little to you other than zero on a failed cable or quite high on a good cable. Careful records should be kept as to connections used, temperature, megohmmeter used, date of readings, who conducted the test, and any other pertinent information concerning the test which is necessary to duplicate subsequent tests. Record readings after 15 and 30 seconds, 1, 3, 5, and 10 minutes, or until there is no increase in reading

(Continued on Page 76)

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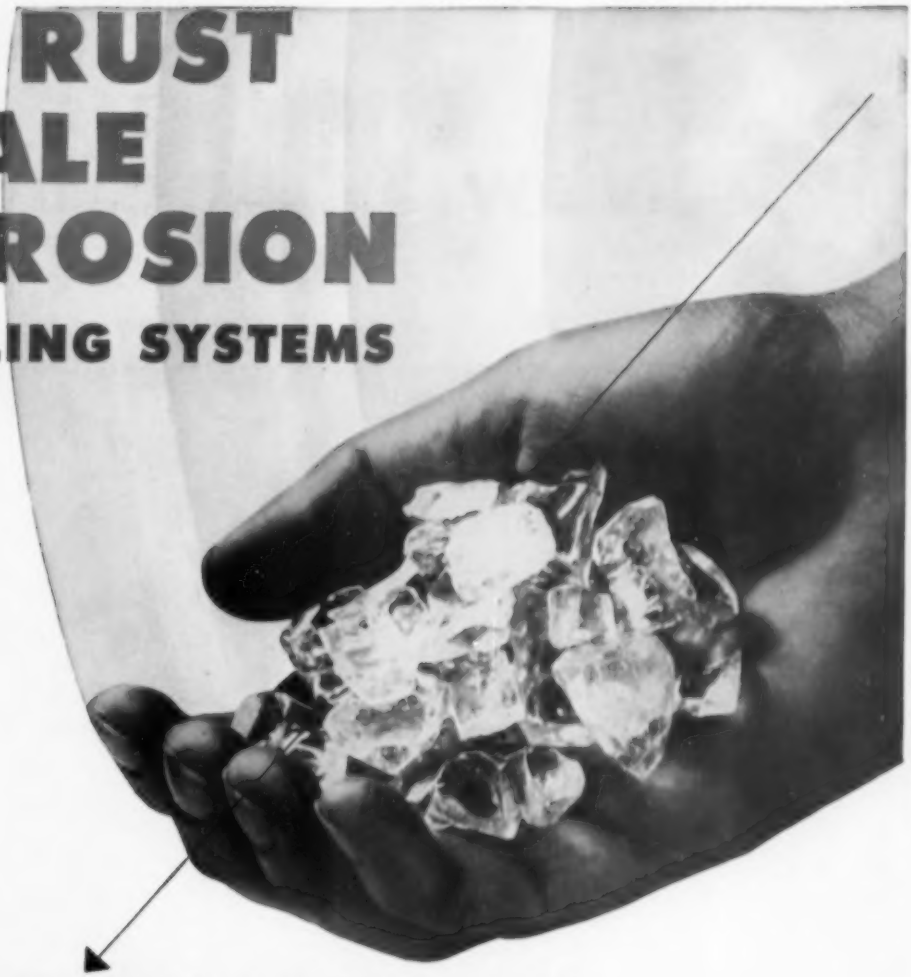

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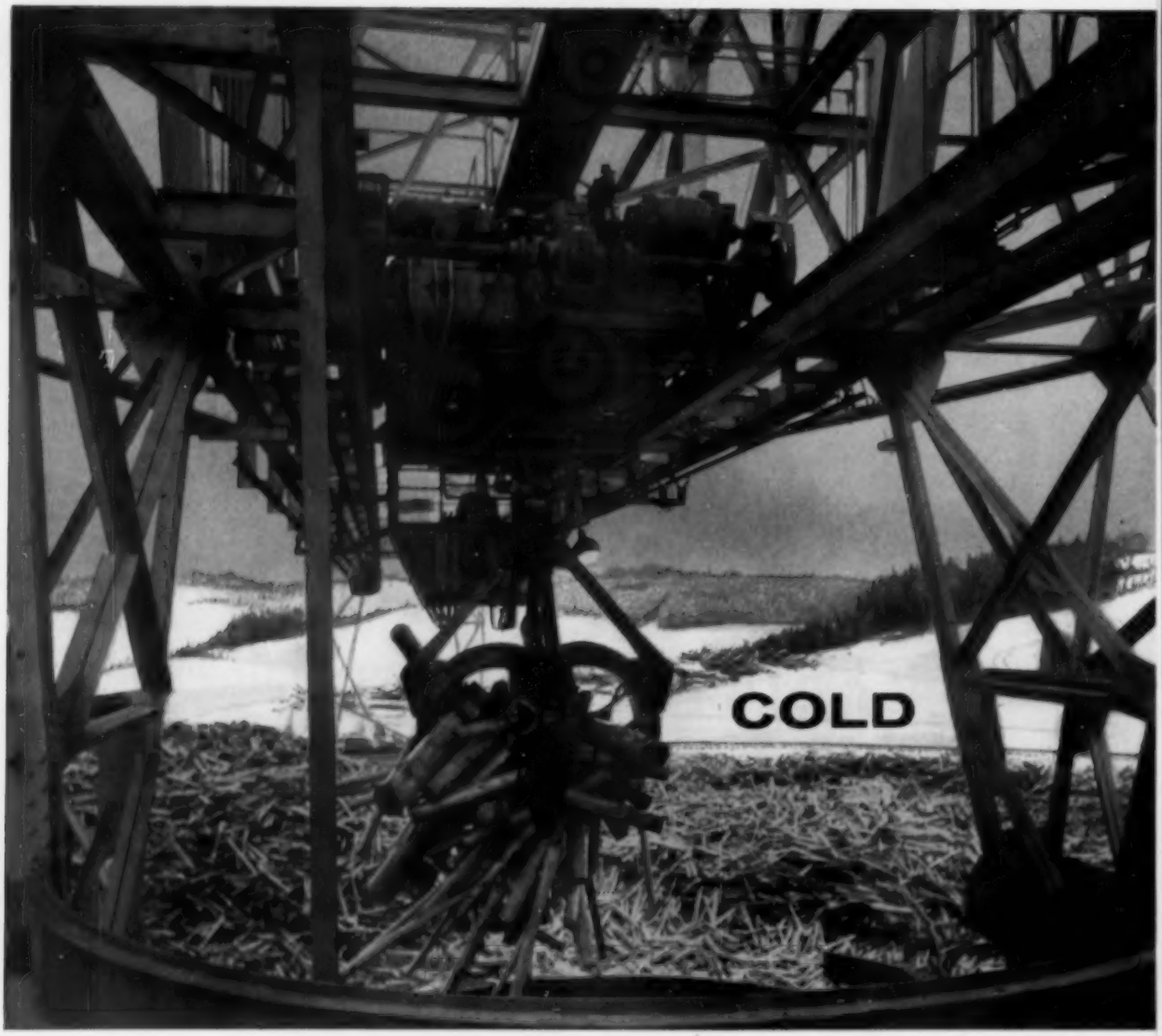

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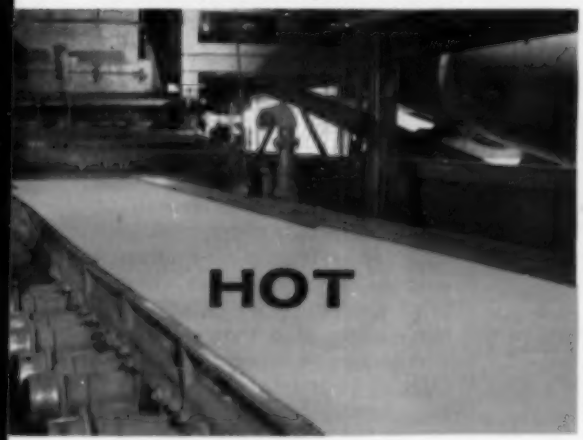

Gulfcrown sheds water—won't wash away. That's why it's a good rust preventive, too, under the dampest conditions such as this wet end of a paper machine.

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Electrical Distribution (Continued)

(but no longer than 10 minutes).

The temperature coefficient of electrical insulation is negative and numerically large; that is to say, as temperature increases, megohm value of the insulation will decrease greatly.

The IPCEA (Insulated Power Conductor Engineers of America) have published a chart of correcting multiplying factors to be used for temperature correction using 15.5C as a base. As an example of the effect of temperature, if a reading is taken at 35C, in order to correct the megohm reading to what it would have been at the 15.5C base, a multiplying factor of 19.00 is used.

The megohmmeter readings should all be corrected to a base temperature such as the 15.5C suggested by the IPCEA, then plotted on semi-log paper for easy determination of any trend. Cards are available with a semi-log graph on one side and appropriate data columns on the other side for recorded data.

It should be realized that even though the individual megohmmeter readings are well above the minimum, a consistent downward trend is an indication of impending insulation failure.

If it is determined after several semi-annual or annual checks that the insulation of a feeder is deteriorating, more frequent checks should be made on that particular feeder so that ample time is allowed to make the necessary replacement during a planned outage.

Although the comparison or trend method is by far the most accurate for determining insulation condition, the "rule of the thumb" method for the first readings taken in establishing your system or for spot checks can be used. The ratio of the 3-or-10 minute reading to the one-minute reading is known as the polarization index or dielectric absorption ratio. If this ratio is below 1.2, there is usually good reason to suspect impending trouble and the cable should be checked frequently for further insulation deterioration.

Transformers

Since transformers are relatively trouble-free, all too often it is assumed that they require no maintenance at all.

The load, voltage, temperature and coolant level of substation and local center transformers should be checked frequently and recorded. In some plants this is done every day, others every week, and some as infrequently as once a month. I believe that once a month is quite sufficient for these inspections unless it is known that the transformer is being operated at high load due to some emergency. In this case, the equipment should

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be carefully observed and once an hour might not be unreasonable.

A survey should be made of your dry type distribution transformers to be certain they are not so located that they are subject to a wetting. They should also be located at least a foot away from walls to insure free circulation of air.

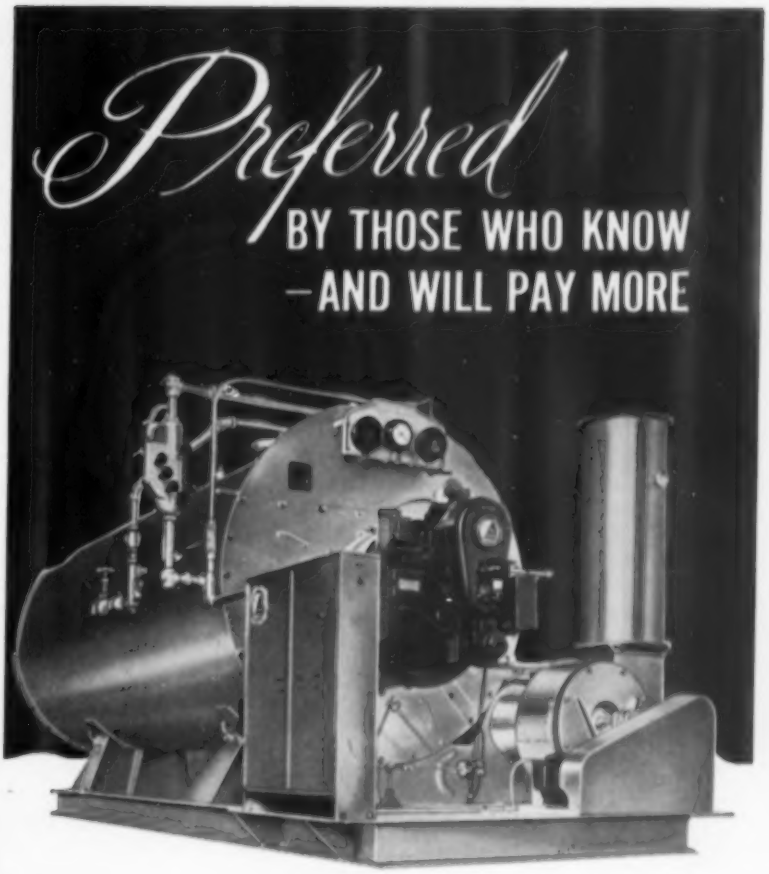
Once a year the dry type transformer should have an internal inspection. Remove it from the circuit and inspect it internally for dust and dirt accumulation, loose connections, discoloration due to overheating, and corrosion.

The windings should be cleaned preferably by a vacuum hose; however, dry compressed air not in excess of 20-25 psi may be used. If the windings are wiped, use a dry cloth. Use of a solvent might be harmful to the insulation. If dry type transformers have been de-energized for a long period, inspection should be made to insure that condensation has not accumulated on the windings.

The preventive maintenance procedure just outlined for dry type transformers in your distribution circuit also applies to any spare transformers you have in stock.

In servicing your liquid cooled transformers, in addition to checking load, voltage, etc., as previously mentioned, a yearly check should be made on the coolant condition and ground connections; look for condensation under the cover, and make a general check for bolt and connection tightness and leaks. If the unit is water cooled, check for scale which, if allowed to build up, will cause the transformer to operate at higher than normal temperature.

To check the condition of the coolant—whether it be mineral oil type of the non-flammable, synthetic type such as Pyranol—take a sample from the unit. Wipe the valve clean and run off some liquid before taking the sample, rinse the sample bottle several times with the liquid being sampled, and be sure the liquid is as warm or warmer than the surrounding air to prevent moisture condensation. Stopper oil or Pyranol sample tightly and take it to your lab or power company



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for a dielectric test.

A standard testing receptacle is used which consists of two one-inch-diameter electrodes spaced one-tenth of an inch apart. This test cup should be thoroughly cleaned and rinsed with the sample to be tested. The liquid being tested should be at the same temperature as the room. Pour the sample in the test cup and allow to stand for about five minutes to permit time for the escape of air bubbles. Apply test voltage as uniformly as possible at the rate of 2 to 3 kv per second. Continue to increase voltage until a permanent breakdown occurs.

If this breakdown is under 22 kv for oil or 25 kv for Pyranol, a filter press should be used on the coolant in the transformer to remove moisture and other contaminants. The oil should be circulated through the filter until the test is 25 kv or higher. If it is Pyranol, the test on the reconditioned liquid should be 30 kv or higher.

I have spent a little time going into the details of checking the dielectric strength of the coolant since it is one of the most important regular checks you should make and record on your liquid cooled transformers.

Relays

Thus far, we have discussed several of the components in your power circuit, all of which are as important as the proverbial link of the chain; however, if I had to pick one of all the power distribution circuit components as being the most important, and the first to be considered when setting up your maintenance program, I would unhesitatingly pick *protective relays*.

A protective relay is engineered and installed for one purpose — to protect your equipment against misuse and against extensive damage in the case of a fault. Dependability is essential, and the relay that is not functioning properly, or is inoperative, is worse than no relay at all since you are depending on its automatic operation to initiate the clearing of a piece of equipment or circuit in the event of trouble.

The frequency of inspection will vary with frequency of operation, type of operation and local conditions. A thorough yearly inspection and test are usually sufficient unless excessive dirt is present or the application requires frequent operation of the relay.

The relay should be inspected for corrosion, missing covers, broken glass and accumulation of dust or dirt inside the relay housing.

The relay should be actuated manually to see that all parts are moving freely and that it performs its proper function, such as tripping a circuit breaker or energizing an alarm.

The silver contacts, if corroded, should be cleaned. Never use files or knives when cleaning. They will leave scratches which will increase arcing and deterioration of the contacts. Abrasive cloth might leave non-conducting particles which will prevent the contacts from closing when called upon to do so.

To clean these contacts, a silver burnishing tool should be used. This is a flexible strip of steel with the surface etched rough. The polishing action is very delicate and although the corrosion is removed, no detrimental scratches are left. The flexibility of the burnishing tool allows cleaning of actual points of contact which sometimes cannot be reached by a rigid tool.

A relay requires no lubrication, and if any of the movements are sluggish, the cause is usually from a cracked jewel bearing. Defective jewels should be replaced and a new steel pivot inserted along with the new jewel. One small drop, the amount that will cling to a fine needle point, of the best grade of jeweler's clock oil should be used on the new jewel and pivot.

In addition to the briefly described mechanical maintenance on relays, there are several checks of the electrical characteristics and settings that should be made annually.

Many of your plants do not have the trained personnel or equipment required to make these checks, and you should enlist the aid of the nearest service shop or the utility company supplying power to your plant. Both are usually equipped with the trained personnel and portable equipment necessary to make the required tests right at your substation. Quite frequently your utility will perform this service with no charge as part of their service and good will policy in selling power. However, if a charge is made, it is money well spent.

The following electrical checks should be made annually:

1. Check time delay setting by simulating overcurrent, overvoltage, ground fault, reverse current or any other type fault against which the relay is designed to provide protection.
2. The relay should have its calibration checked for current and voltage at the pickup, dropout and several intermediate points.
3. Load the relay electrically with a calibrated variable resistance box made for this purpose and actually trip the circuit breaker that depends on the relay functioning at overloads and/or short circuits. This will give you a check on the relay as well as the breaker tripping circuit.
4. Check the actual load current in a feeder against the current setting of the overcurrent relay protecting that feeder. Quite frequently loads grow by small increments on a feeder and suddenly the breaker trips because its relay current setting has not been correspondingly increased or not initially set properly for the capacity of the feeder. This always seems to occur at the most inopportune and embarrassing time.

The relatively inexpensive preventive maintenance of the components which I have discussed, along with a similar procedure for circuit breakers, substation batteries, etc., can be readily incorporated into your existing manufacturing equipment productive maintenance program.

Always Stronger Than They Need Be!

MIDWEST WELDING FITTINGS

Below are photographs of two of the many tests that have been made of Midwest Welding Fittings. The results are *always* the same . . . the seamless pipe to which the fittings are welded invariably bursts. There is *never* any sign of fitting failure or weakness.

There's good reason for this. We make elbows and tees of inherently stronger metal . . . the Midwest exclusive method of manufacture enables us to maintain greater minimum wall thickness, and to reinforce the fittings at points of greatest stress. For the many other advantages of Midwest Fittings, ask your Midwest distributor or write us for Catalog 54.

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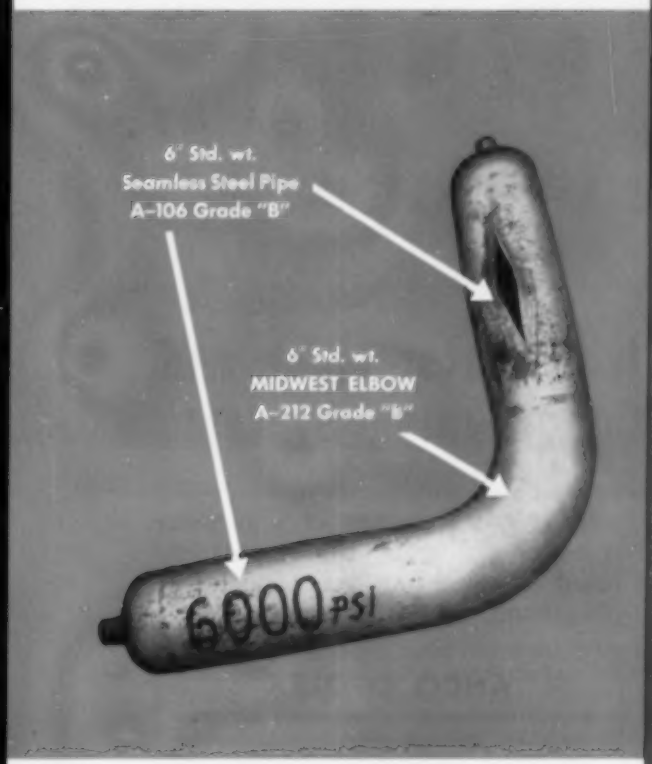
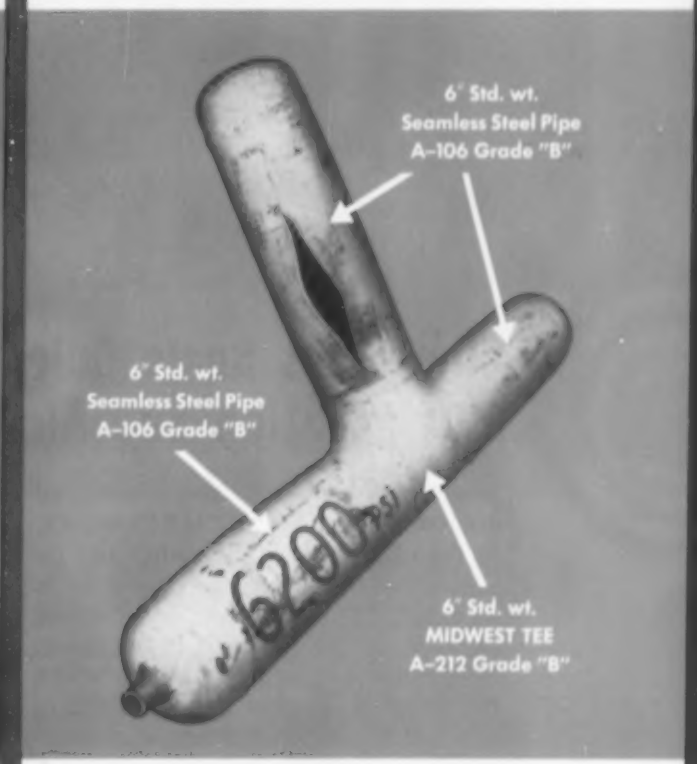


Typical bursting test of stock Midwest Welding Elbow. As is always the case, failure occurred in the seamless pipe while the elbow was undamaged. Bursting pressure was 6000 psi . . . considerably above the required code minimum for seamless pipe. (Minimum allowable bursting pressure for 6" standard weight A-106 Grade B seamless steel pipe is 4438 psi.)

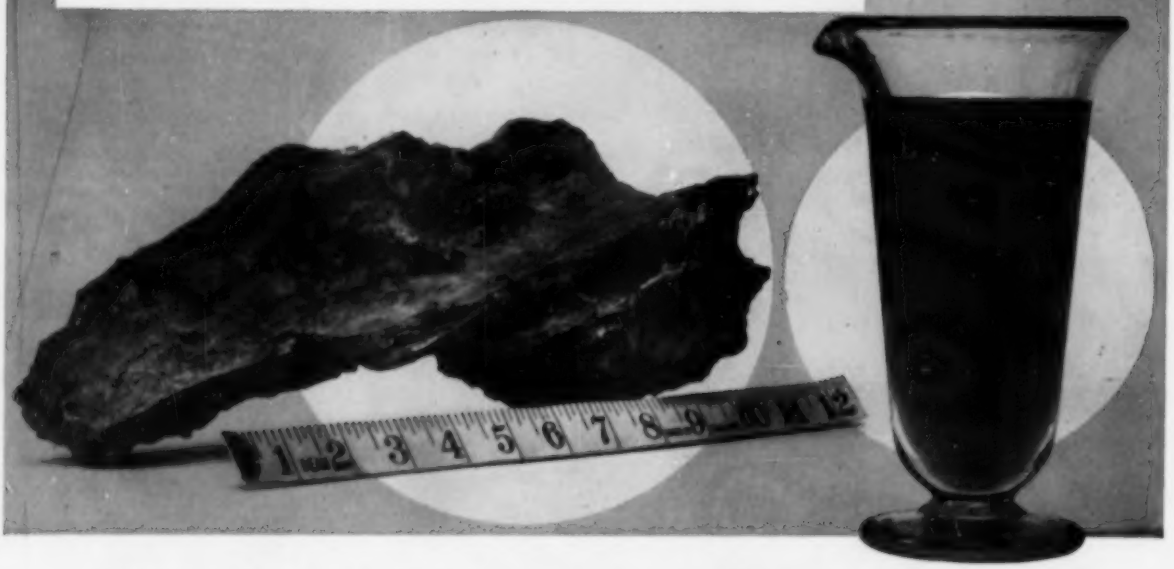


Bursting test of Midwest Welding Tee taken at random from stock. As always, the failure occurred in the seamless pipe and not in the fitting. The non-shock internal bursting pressure of 6200 psi is well above the code minimum for seamless pipe. (Minimum allowable bursting pressure for 6" standard weight A-106 Grade B seamless steel pipe is 4438 psi.)

7761

MIDWEST **WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS**

HEAVY SCALE IS REDUCED TO LIQUID BY ANCO SCALE REMOVER



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Even heavy scale formation is dissolved in a few hours by ANCO SCALE REMOVER. In the case of air conditioning and refrigeration equipment, no shutdown is necessary. This efficient dry formula works while the system is in operation. No damage to equipment. ANCO SCALE REMOVER is harmless to metal surfaces and will not irritate workmen's skins.

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keeps air conditioning and refrigeration condensers free of scale. This inexpensive, effective formula also protects metal surfaces against rust and corrosion, maintains low head pressure and maximum operating efficiency.

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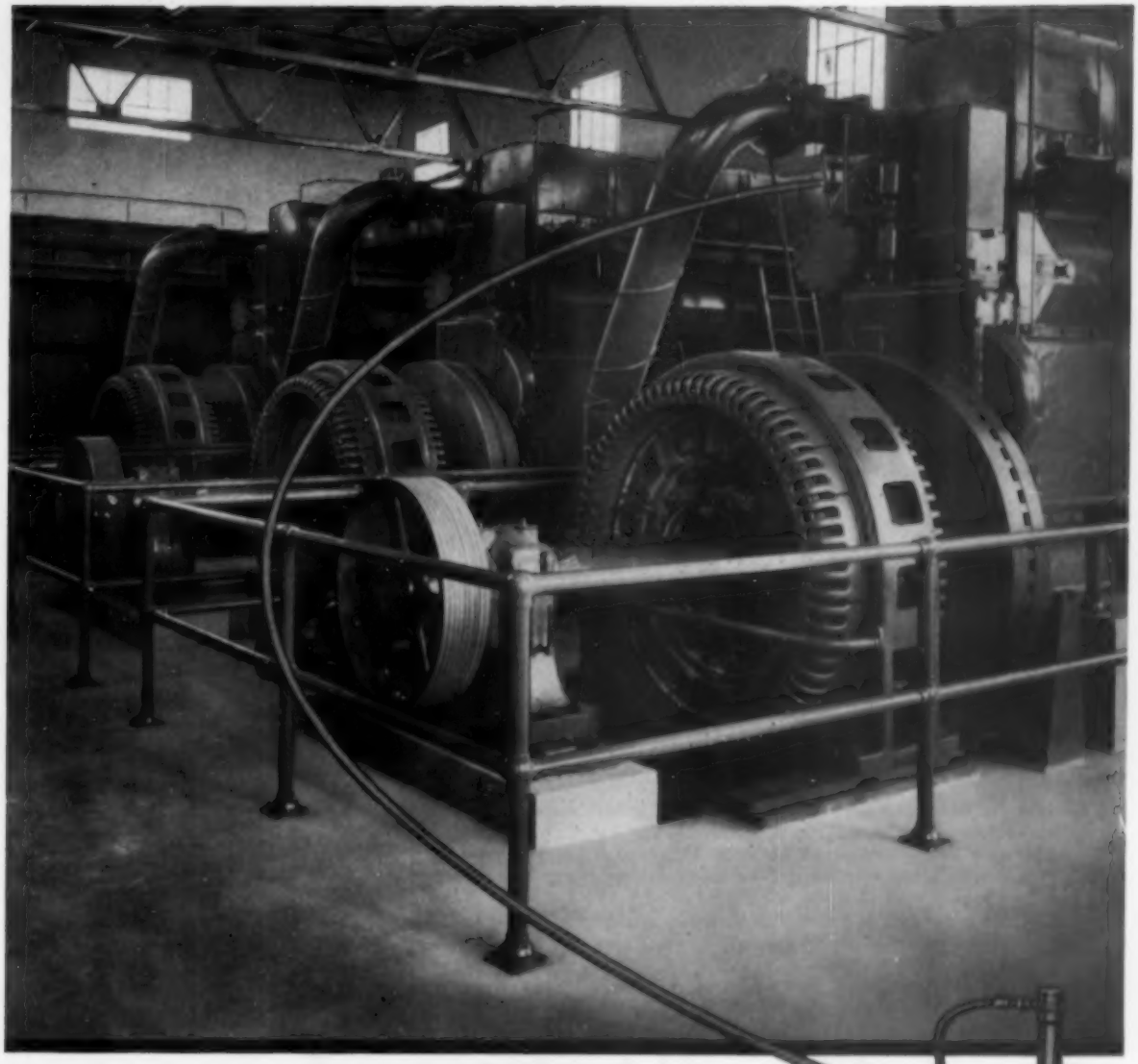

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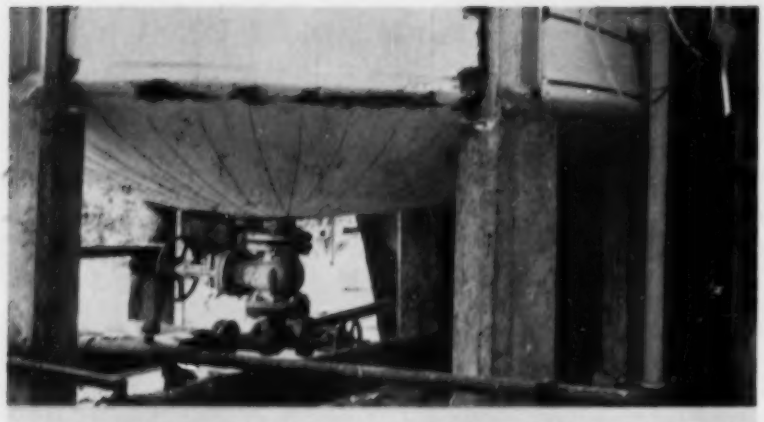
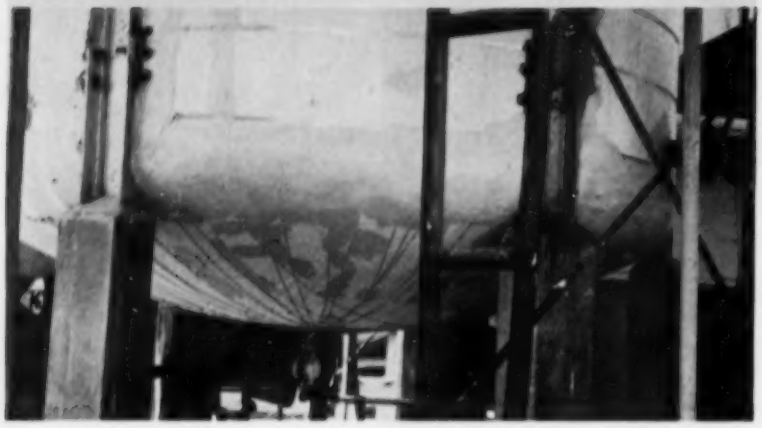
Stop the formation of varnish, sludge and carbon in your Diesels and *keep it stopped* with Sinclair RUBILENE®, the high viscosity index oils proved by over 35 years in industrial Diesel applications. RUBILENE earns its reputation by its performance under continuous operation and heavier loads. It fights deposits and gives better protection to cylinders, pistons, rings and other vital moving parts. Your Diesel stays on the job longer . . . service time is cut 'way 'way down!

Let RUBILENE help solve your lubrication problems. Regardless of the make or age of your Diesel, where a high VI oil is needed, there's a member of Sinclair's RUBILENE or RUBILENE HD family that meets your requirements exactly. Call your local Sinclair Representative for further information or write for free literature to Sinclair Refining Company, Technical Service Division, 600 Fifth Ave., New York 20, N. Y. *There's no obligation.*

SINCLAIR RUBILENE OILS





The upper view shows neat joints of shop fabricated head. The field fabricated insulation (lower view) shows necessity for mudding wide joints.

Faster Maintenance at Lower Cost

Shop Prefabricated Insulation

By B. V. ANDERSON and L. A. ENDICOTT
Carbide and Carbon Chemicals Company
Texas City, Texas

INSULATION maintenance has become recognized as an integral part of general plant maintenance. This recognition is the result of increasing demands for temperature control and safety which have increased the annual use of thermal insulation materials.

Insulation materials, like equipment and machinery require maintenance, and in the past this was considered as a field problem only. However, in order to meet the rapidly increasing insulation requirements, it was necessary to look for shortcuts.

This was accomplished by analysis of job records. The analysis revealed that fitting fabrication consumed approximately one-third of the total labor costs. It seemed logical that the elimination of field fabrication was the shortcut. Therefore, an insulation fabricating shop was established.

The following indicates a sequence of operation but not necessarily the order of importance. The shop and field insulation supervisors plan and schedule the work according to a priority. Prepared forms have been adopted for use by the field supervisors to requisition fabricated fitting covers, lagging, and specialties from the Insulation Shop.

Estimates are made of all jobs sent to the shop, and records are kept of the estimated and actual time spent on each job. For the past two years, these daily records have been kept on file for use and comparison of previous years' performance and have insured good cost control.

Our records have proved justification of shop prefabricated insulation fittings and specialties.

One instance follows: Two duplicate 8 foot diameter dished heads required insulation. One was field fabricated and the other was shop fabricated. A 28 per cent savings of the total labor cost of the job was realized with the shop fabricated head. A comparison of workmanship may be seen in the photographs.

In 1955, our records showed an overall savings of 56 per cent on shop fabrication as opposed to field fabrication. In 1956 because of improved shop facilities and experience, an additional 15 per cent savings was realized. Since the development stage of the insulation shop, both in experience and facilities, appears to be nearing completion, it is expected that we have reached the leveling off point in the percentage of savings. Therefore in 1957, a savings of 80 per cent may be expected through shop fabrication.

The above savings are tangible; however, there are also certain intangible savings. An estimated value for these will not be discussed in this article, but the reader should be made aware of them. The speed and ease of application of fabricated fittings is an advantage; but the important thing is that fabricated fittings may be used over and over, and this indeed is a real savings.

A Record Unmatched In The Industry . . .

In *Every One* of the Nation's "Top Six"* Steam Power Plants, Fly Ash Control is by *Western Precipitation!*

As most power plant executives know, the Federal Power Commission annually "rates" the major steam power plants of the United States to determine their overall thermal efficiency as represented by their heat rate (i.e., BTU of fuel consumed per KWH of generated power).

*The "Top Six" steam plants according to the most recent Federal Power Report are . . . 1. Kyger Creek Plant (Ohio Valley Electric) . . . 2. Clifty Creek Plant (Indiana-Kentucky Electric) . . . 3. Kanawha River Plant (Appalachian Electric Power) . . . 4. St. Clair Plant (Detroit Edison) . . . 5. Muskingum River Plant (Ohio Power) . . . and 6. Tanners Creek Plant (Indiana and Michigan Electric).

We at Western Precipitation Corporation, take great pride in the fact that—in EVERY ONE of these "Top Six" plants—the equipment selected for fly ash control is WESTERN PRECIPITATION equipment.

Could there be any greater testimony to the outstanding superiority and unsurpassed efficiency of Western Precipitation fly ash control equipment?

COTTRELL Electrical Precipitators
MULTICLONE Mechanical Collectors
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Rotabins save space and make maintenance items readily available.

Storing Small Parts

Louisville Plant Emphasizes Maintenance in Planned Progress

PROGRESS is not a happenstance in the beehive busy plant of Tube Turns, Louisville, Ky. — a division of National Cylinder Gas Company, Chicago. It is the result of sound planning and a never ending search for ways and means of doing jobs better. All departments are responsible for progress, in the sense the word is used here, and they frequently team up to bring about improvements in manufacturing operations.

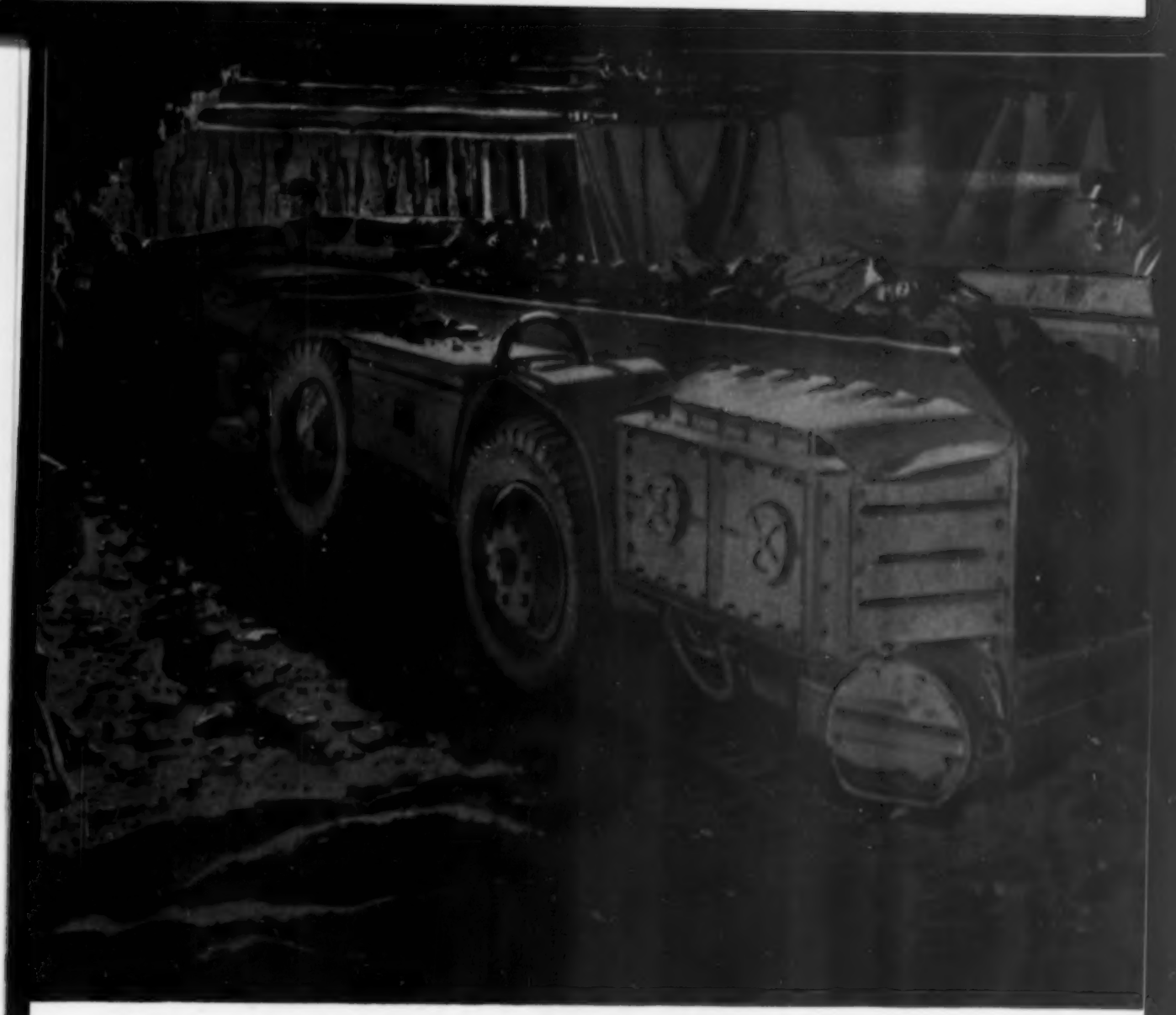
An interesting instance of effective planning and coordinated effort is an installation of Rotabins, used for storing small parts required for the maintenance of equipment. The installation was recommended by the General Stores Department and the Plant & Production Engineering Department made it a reality.

Each of the Rotabins, shown in photo, takes the place of nine linear feet of conventional shelving. They are designed so that the highest bin is below eye level and all stored items are visible at a glance. By rotating the bins, each item is brought to one easily reached point and parts can be issued in a minimum of time.

The ruggedly constructed steel Rotabins, all carefully labeled so that parts can be quickly identified, have eight tiers. They are surmounted by steel cabinets with vertical and horizontal compartments in which larger materials can be conveniently stored.

The employment of Rotabins has more than doubled the capacity of the small parts storage area.

Tube Turns is the nation's oldest and largest manufacturer of forged welding fittings and flanges for industrial piping systems.



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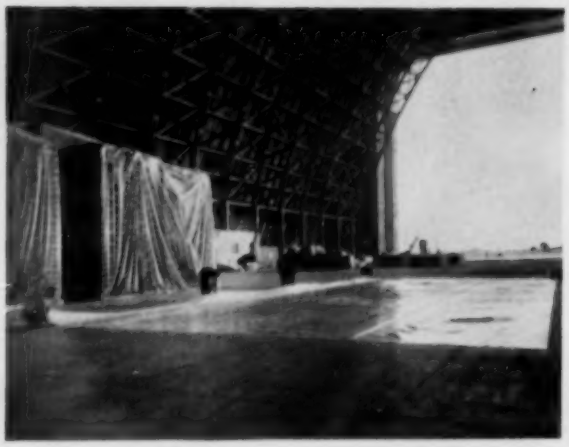


Made of Bakelite polyethylene, Visqueen film is fabricated into extra-wide sheets for covering stored goods

Film Protects Goods in Warehouse

FILM COVERS, up to 80 ft wide and 400 ft long, can greatly simplify the task of protecting large stacks of food and other goods in a warehouse from contamination and infestation. The new film covers, made of Bakelite polyethylene, consist of strips which have been welded together electrically by H. T. McGill of Houston, Tex.

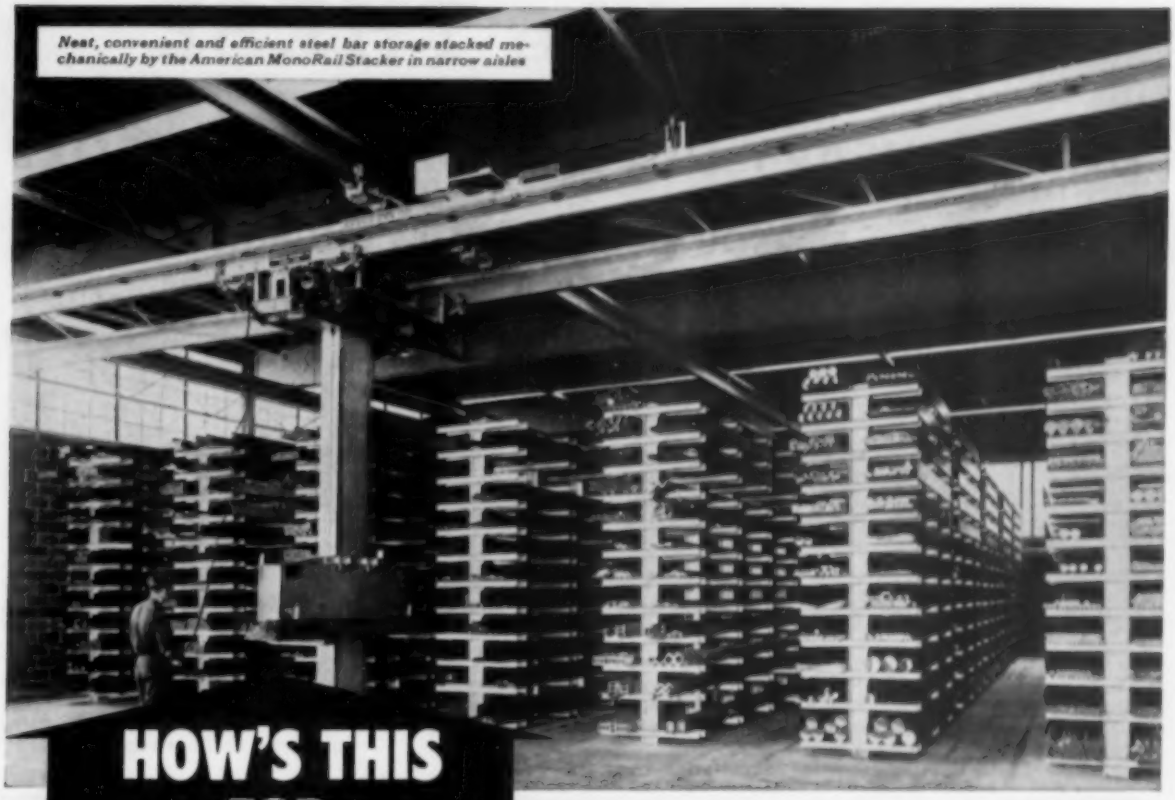
The warehouse covers shield against dirt, dust, water, insects and birds. They also provide economical, on-the-spot fumigation chambers. More than 800 carloads of bagged rice are stored under these film covers in the Blimp Base Warehouse, Hitchcock, Texas, for Commodity Credit Corporation (top left photo).

Film made of Bakelite polyethylene remains flexible in cold weather, and is so light in weight that these extra-wide sheets can be quickly laid over or removed from a stack of goods with relatively little labor. Even products stored only temporarily in a shipping or dock warehouse can thus be protected against dirt, moisture and other contaminants at low cost.

A sheet 65 by 65 ft square and .003 of an inch thick, which covers four carloads of rice bags in a single stack, is easy to handle because it weighs only about 60 lb (top right photo).

Fumigation of newly received food stocks to eliminate possible hidden insects or eggs is greatly simplified with the new stack covers. To provide a gas seal, edges of the sheet are held tightly against the floor by long, slim polyethylene film bags partly filled with sand (bottom left photo). Fumigant is then fed into the single covered stack from a portable tank (bottom right photo).

The chemical resistance of film made of Bakelite polyethylene also makes it possible to spray residual, contact-killing insecticides in areas around the covered stacks. The film covers tend to fend off rats or mice, according to the fabricator. However, if a gnawed hole indicates the presence of rodents, it can be patched with adhesive tape or a hand heat-sealer, and the pests killed with a dose of fumigant.



Neat, convenient and efficient steel bar storage stacked mechanically by the American MonoRail Stacker in narrow aisles

HOW'S THIS FOR STEEL STORAGE!

American MonoRail engineers, working with Hawkridge Brothers Company, designed this system for storing bars, rods and other long steel shapes.

Note the extremely narrow aisles and maximum height of racks. Bars and rods, 20-22 feet long, are placed in pans 18 feet long. The American MonoRail Stacker transfers these pans to either side of an aisle for storage.

MonoRail Stacker forks support bar in saw. Saw with extension rolls to any convenient spot in the warehouse.

American MonoRail Stacker lowers a banded bundle of bars over prongs which ingeniously splits bands, lets bars roll into trough for pick-up in a tray

Photos: Courtesy of Hawkridge Brothers Company, Waterbury, Conn.

Member of Materials Handling Institute - MonoRail Association

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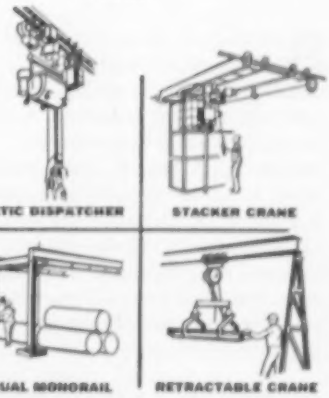
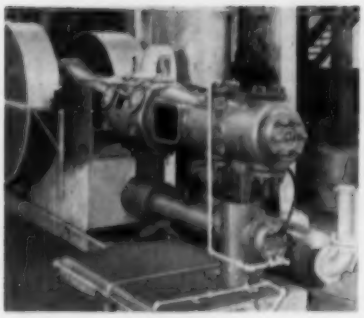


For more information, use Reply Card—Page 121

For jobs like THESE

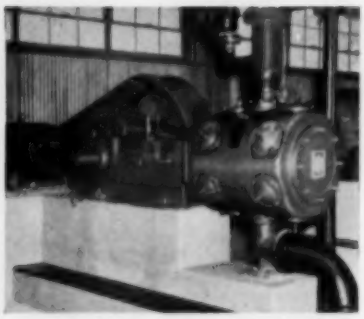
CHOOSE HEAVY-DUTY ES COMPRESSORS

for pressures to 2500 psi—sizes 5 to 150 horsepower

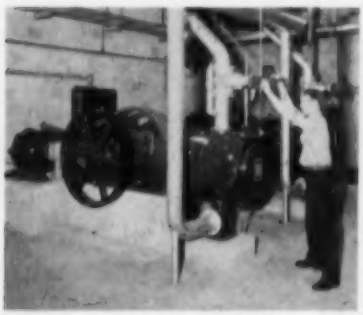


SOOT BLOWING The steam power plant of a large paper mill uses this ES to furnish high pressure air for boiler-tube soot blowing. This V-belt driven 125-hp unit compresses air to 350 psi in two-stages.

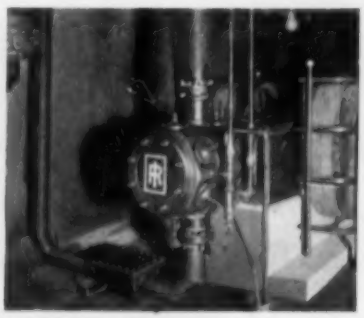
PROCESS GAS COMPRESSION In this unique outdoor installation, a two-stage ES compressor with V-belt drive compresses still vapors in a large modern gasoline plant.



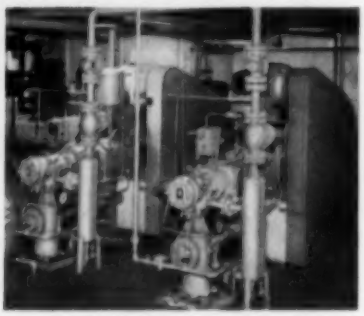
AIR LIFT SERVICE Shown here are two of the three Ingersoll-Rand ES compressors installed in a copper mine to provide pressure for elevating acid from the bleaching tanks by the air-lift principle.



GLASS MOLDING Here in a large lamp manufacturing plant, two ES compressors supply 50-psi air for cooling gas furnaces and for high pressure gas jets used in glass molding. Pressure is reduced to 30 psi to drive air-motor driven agitators.



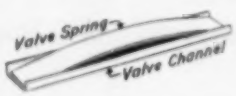
BOOSTER SERVICE Installed on the 4600 ft level of a large mine, this Ingersoll-Rand ES compressor boosts air pressure to get full power out of rock drills and other air-powered equipment.



AIR STARTING SERVICE A large transcontinental pipeline station uses these two ES compressors to supply 250-psi starting air to its I-R gas engine compressors. Both have overhead motors and one unit is provided with a standby gasoline engine.

SHOWN here are just a few of the countless ways in which Ingersoll-Rand heavy-duty ES compressors are serving industry. A wide range of standard cylinder arrangements and types of drive enables them to meet virtually any operating conditions within their size and capacity limits. Their efficiency is high and operating and maintenance costs low. Ask your I-R representative for help in solving any compression problem.

Only I-R compressors have CHANNEL VALVES



Known for high efficiency, quiet operation and almost unbelievable durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and leaf springs, with trapped-air spaces which give cushioned action.

Ingersoll-Rand

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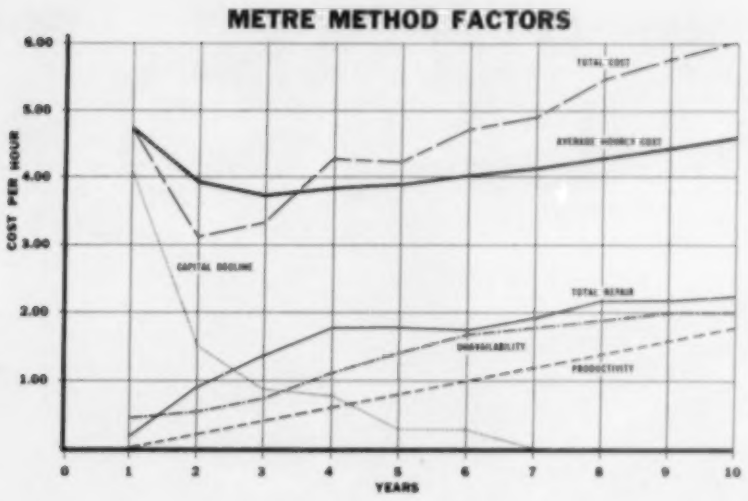
COMPRESSORS • GAS AND DIESEL ENGINES • ROCK DRILLS • PUMPS • TURBO-BLOWERS • AIR AND ELECTRIC TOOLS



When Should You Replace Equipment

The METRE Method

WHEN SHOULD an old machine be replaced? How can it be determined that it is more economical to replace present equipment with a new machine particularly when the present machinery appears to be operating satisfactorily? The following method was primarily worked out for crawler tractors, but it can be applied to other types of equipment.

The METRE (Most Economical Time to Replace Equipment) method has been developed by Caterpillar Tractor Co. to aid the equipment owner to detect the point of lowest possible hourly operating costs. This important factor can be removed from the realm of intuition and evaluated on a dollar and cents basis. The accuracy, of course, is dependent upon the specific data the owner can supply from his own records.

The chart shows how these costs are plotted. In making these charts, Caterpillar used an average-sized machine, costing about $20,000, and assumed it would work 1,800 hours each of the first three years, and 1,500 hours each year thereafter. In this example, the lowest hourly rate occurred at the end of the third year. The 11 cents difference between the third and fourth years appears to be small, and many owners wonder why they should replace on such a small basis.

It must be understood that if the tractor was originally set up to operate for three years, the charge per hours for the fourth year would then be $4.25 per hour. The actual difference in dollars between the third and fourth year operation would be $759.00 (or 6,900 hours at 11 cents per hour).

Before getting into the mathematics of economical replacement, it is important to review some of the factors to be considered. The first and most evident factor is major repair and overhaul costs. But of equal importance, though not so apparent, are the costs of productivity, unavailability and capital decline.

Repair and Overhaul

As a piece of equipment gets older, the repair cost gets higher. For example, the engine would require only rings, liners and a valve job on the first overhaul, but on the second might require new crankshaft, bearings and pistons, plus the same items as on the first. A similar pattern would apply to the cable control, master clutch, steering clutches and other components serviced as a whole.

Productivity

One of the most difficult factors to measure is productivity. Improvements are constantly being made. Tractor horsepower has increased approximately 20 per cent in the last ten years. While horsepower is not directly proportional to increased production, other improvements, such as hydraulic-boosted controls, better visibility and better stability, increase at about the same rate as horsepower.

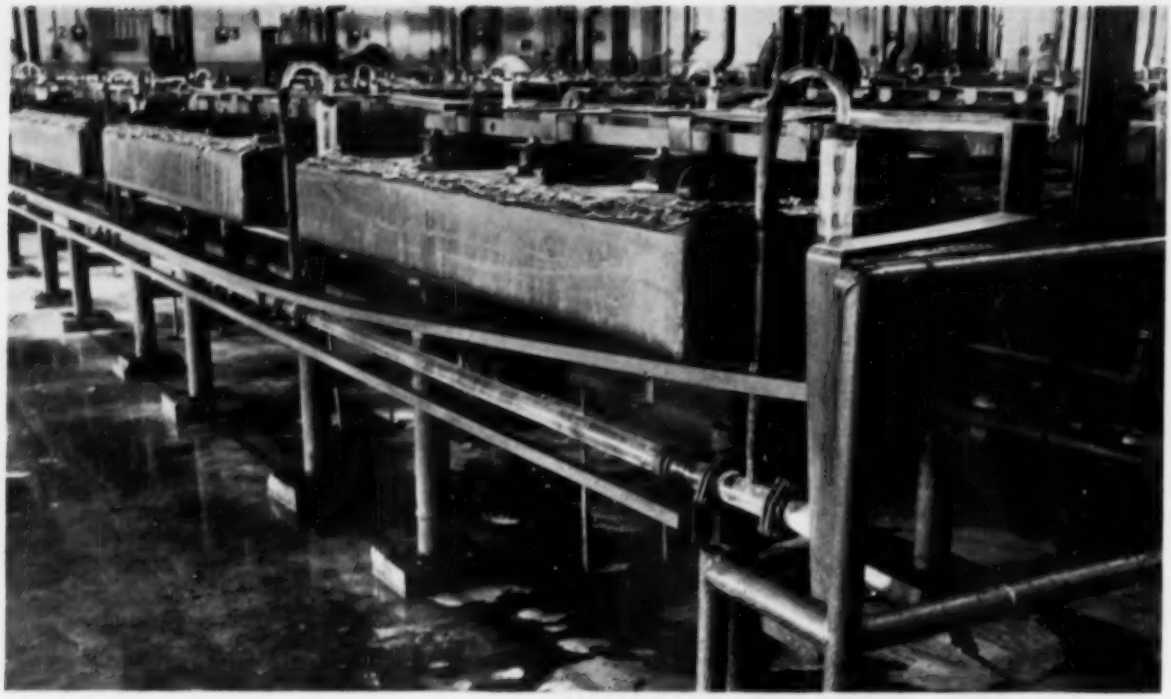
If an old tractor is used, it should be charged with the difference in ability to produce between it and a new machine. This charge should not be made in all cases. If the old machine can supply all the needs of a crusher plant, a new machine can add no productivity. In this case productivity is governed by the unit it is working with, rather than the tractor itself, or it might be governed by plant requirements.

This charge may be made in several ways. If it is working alone, a fair, although conservative, way would be to charge the tractor with the cost of renting a machine to make up the lost production. If the tractor is push-loading scrapers, it should be charged with the cost of renting a push tractor and scrapers to make up this lost production.

Availability

The machine should also be judged on the basis of availability, or the number of hours the machine is down in comparison to the number of hours it could have worked. This should not include time for major overhauls, but should include any delays for minor adjustments, repairs and greasing.

A new tractor will usually be available about 96 per cent of the time. The older a machine, the more time will be required for adjustments and repairs. To charge a tractor for not being available, compute the cost of



Brine feeder lines and spent brine lines connected to Ecusta Paper Division's Sorenson-type chlorine cells are of Pyrex brand glass pipe. After nearly a decade of use, lines show no corrosive damage.

GLASS PIPE for Corrosive Liquids

PERHAPS you think of glass pipe as a laboratory item—and it is. But plants that handle chemicals in a big way have known for years that it is also highly reliable production equipment where the materials handled are especially corrosive to metals.

The purpose of this item is to call it to the attention of engineers who may not have considered it as a solution for worrisome small corrosion problems. The ones with big problems already know about it.

Pyrex brand glass pipe is recommended by Corning Glass Works for its resistance to acids and moderate alkalies, the prevention of contamination, and its visual characteristics which permit inspection and its low installation and service cost. However, there are those who are skeptical about glass pipe because of the fear of breakage. With proper installation, breakage is no problem with glass pipe in recommended usages.

The photograph shows an installation in a southern paper mill that has proved highly satisfactory.

Metre Method

(*Starts Page* 89)

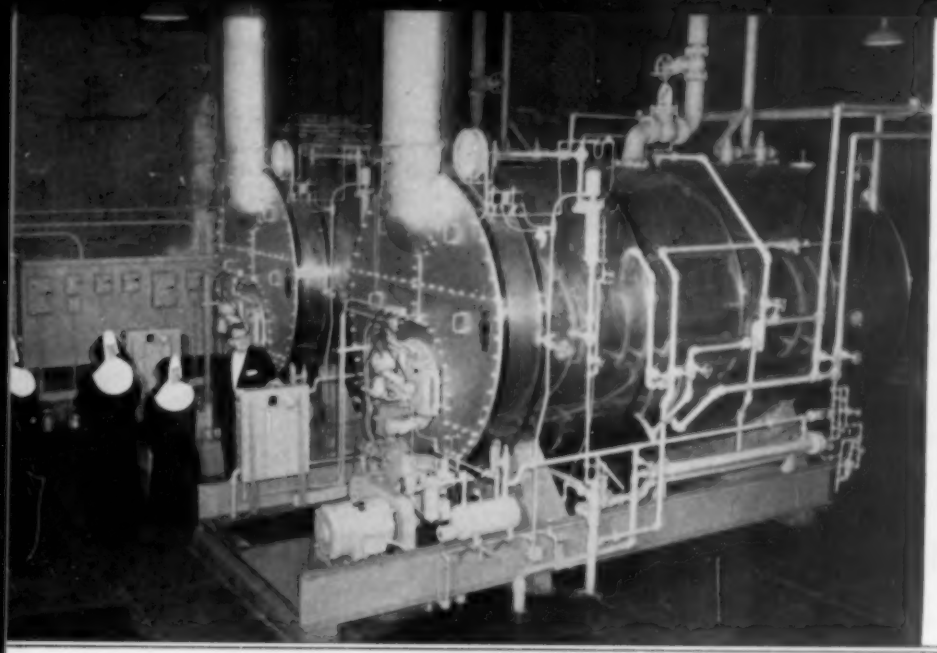
renting a comparable size machine during the time the tractor is not available.

Capital Decline

Equipment owners do not replace equipment every season, usually, because the difference between original cost and trade-in value would cause prohibitive operating costs. This difference is called "Capital Decline." This cost, the difference between purchase price of a current machine and true value of the existing machine, should be charged to the tractor in the year the decline occurs, and not averaged over the life of the machine.

Metre Method

To determine the most economical time to replace equipment, find the total cost of major repairs and overhauls, productivity, availability, and capital decline for each year. Then average the costs of the first and second years to find the average cost per hour if traded at the end of two years. Do the same for the first three years, and so on until the lowest cost per hour is found. The number of years which will produce the lowest hourly cost would be the number of years the equipment can be economically operated.



NEW BOILERS combine efficiency and handsome appearance. Edward S. Green, Edgemont (Pa.), contractor, was responsible for this superior installation. Pictured left to right are: Sister M. Cor Immaculatum, Immaculata College Treasurer, Sister Jean Marie, Community Treasurer, Reverend Mother Maria Alma, Superior General and Salvatore S. Guzzardi, Consulting Engineer.

OLD BOILER was a coal-fired HRT model — typical of many replaced by modern Cleaver-Brooks oil, gas or combination oil/gas fired boilers.

Consulting engineer* tells how Immaculata College boiler modernization saves estimated $12,000 each year

Salvatore S. Guzzardi CONSULTING ENGINEER

2928 LEWIS TOWER · PHILADELPHIA 2, PA · KINGSLEY 6-2777

December 20, 1956

Mr. John C. Cleaver, President
Cleaver-Brooks Company

Dear Mr. Cleaver:

Recently our office was retained to make an impartial, exhaustive engineering study of the 40-year old boiler plant and steam system at Immaculata College, Immaculata, Pa., which is staffed by the Catholic order, Sisters of the Immaculate Heart of Mary.

As a result of our recommendations, two fully automatic, oil-fired, 350 bhp Cleaver-Brooks package steam boilers, (12,000 lbs/hr steam each), replaced three hand-fired coal boilers and steam-driven auxiliaries. The new boilers are operating at approximately 80% boiler efficiency year-round.

Conversion of coal firing to automatic #6 oil firing and increased boiler efficiency has reduced the fuel cost approximately 50% -- amounting to a saving of $12,000 each year.

The Cleaver-Brooks boilers burn #6 oil and operate automatically at 80 pounds steam pressure 'round the clock -- without the presence of operators in the boiler room. Eliminating boiler plant labor saves the College $7,500 each year.

The cost of the boiler plant modernization will be paid for out of fuel and labor savings in approximately 2-1/2 years.

Commendation for this outstanding performance of the Immaculata boiler plant is due to your well-engineered boiler design and to the cooperation of your skilled servicemen. The results achieved were so impressive that the Sisters subsequently modernized their Villa Maria Convent, Westchester, Pa., with two 100-bhp Cleaver-Brooks boilers.

Sincerely yours,

Salvatore S Guzzardi

***Salvatore S. Guzzardi** — Award-winning head of an organization of experienced professional engineers specializing in modernizing power service facilities. Clients include: Pennsylvania University, Baldwin-Lima-Hamilton Corp., H. Daroff & Sons, Sun Shipbuilding & Dry Dock Co. and City of Philadelphia.

Surveys show 32% of boilers now in service are 30 years old; 56% are over 20 years old

If your boiler fits this description, we recommend an immediate survey. "In 90% of the plants surveyed," summarizes Mr. Guzzardi, "we have found it possible to save thousands of dollars and to pay for the recommended improvements out of annual savings within one to three years."

Again and again the proved economy of Cleaver-Brooks four-pass, forced-draft boiler design results in savings reports as impressive as this. Contact your nearest Cleaver-Brooks representative for more facts on the complete line of steam and hot water boilers — 19 sizes, 130 models, 15 to 600 hp — for heating or processing. Or write Cleaver-Brooks Company, Dept. F, 305 E. Keefe Ave., Milwaukee 12, Wis., U.S.A. Cable Address: CLEBRO—Milwaukee—all codes.

Cleaver Brooks

ORIGINATORS OF SELF-CONTAINED BOILERS

Cooling Units Cleaned

COMFORT COOLING is now taken for granted and when we are deprived of this luxurious miracle, loud protests are heard. Such was the case at the Peachtree on Peachtree, one of downtown Atlanta's most fashionable hotels.

Like many other buildings and plants in our cities, provision was not made in the original architecture for air-conditioning equipment. In this hotel, the only space available was a small compartment on each floor, large enough for packaged cooling units. A large induced draft tower on the roof cools the condenser water for all of the nineteen units.

Anderson Chemical Company was invited to submit a proposal for conditioning of the condenser cooling water. Although their proposal seemed practical and their price favorable, competition nudged Anco to second choice.

The company's local service engineer continued to call on the hotel and at one time was requested to make an analysis of the cooling water. The Anderson testing system, which each service engineer is equipped to run, indicated a scaling condition that predicted certain trouble unless proper corrective measures were taken. But being human as we all are, the operators were reluctant to make any changes as long as they seemed to be getting along all right.

Then one hot day at the peak of the cooling season, it happened. Within a ten hour period, fourteen of the nineteen cooling units exceeded head pressure limits and cut off. Guests in the hotel were not interested in "why"; their only concern was that they had paid for air-conditioned rooms and were not getting them.

The engineers worked all night long acid-cleaning each individual condenser only to learn in the heat of the following afternoon that not enough scale had been removed to permit the units to operate properly. In the meantime, the hotel engineer learned that Mr. C. E. Mitchell, chief engineer at the nearby Piedmont Hotel had been using the Anderson conditioning system successfully for several years in an even more elaborate system.

Anco scale remover was easily added to the water in the cooling tower. The sales engineer mixed the chemical with his bare hands, demonstrating that it did not effect the skin or metal as did the acid they had previously used.

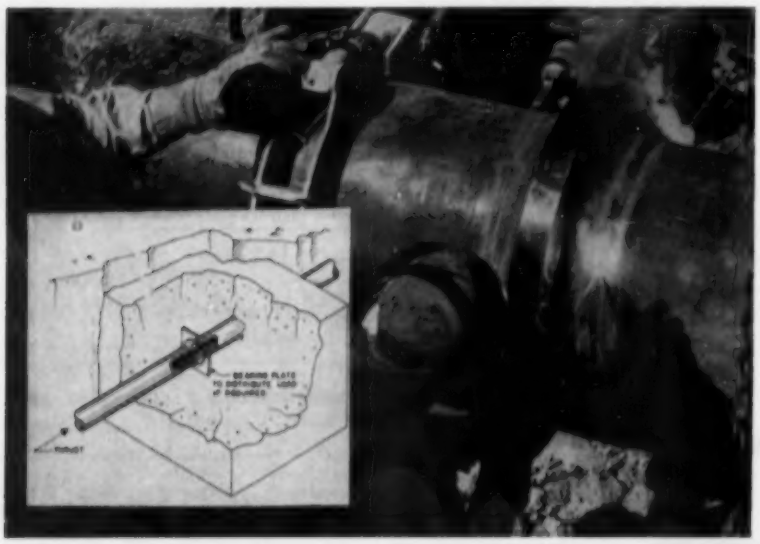
The dissolved scale remover quickly circulated to every cooling unit and by the time the engineer could make the round of punching the reset switches, enough scale had already been removed to permit operation while the condensers were being thoroughly cleaned. Several hours later, during which time the cooling operation was maintained, the contaminated condenser water was drained and replaced with fresh water. This was circulated for a

Anchor Holds High Pressure Piping

THE PROBLEM of how to satisfactorily anchor high pressure oil and gas pipelines — particularly at compressor stations, river crossings and valve and meter settings—is reported to be more adequately solved with the recent introduction of an improved welding neck anchor forging. The Texas Gas Transmission Company and other large transmission companies are already employing it.

The forging takes the form of a double hubbed flange with no bolt holes, which may employ a bearing plate to distribute the load. The hubs, of the straight taper type recently adopted by MSS for large diameter pipe line flanges, are butt welded to the pipe where it is to be held immobile, and the assembly is buried in a reinforced concrete block of suitable dimensions. The Welding Neck Anchor Forging is produced in any of the materials customarily used for flanges.

Properly employed, it helps to protect valves and other compressor station equipment from possible damage, and it reduces maintenance costs and the hazards that may occur when conventional steel straps are used for anchoring purposes.

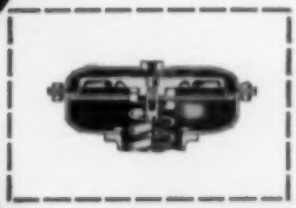


Here a field crew of the Texas Gas Transmission Company installs an anchor forging in a 30" line at Eunice, La. The forging was later imbedded in a concrete block. The drawing shows a cutaway view of the new anchor and installation details.

Any Way You Look At It

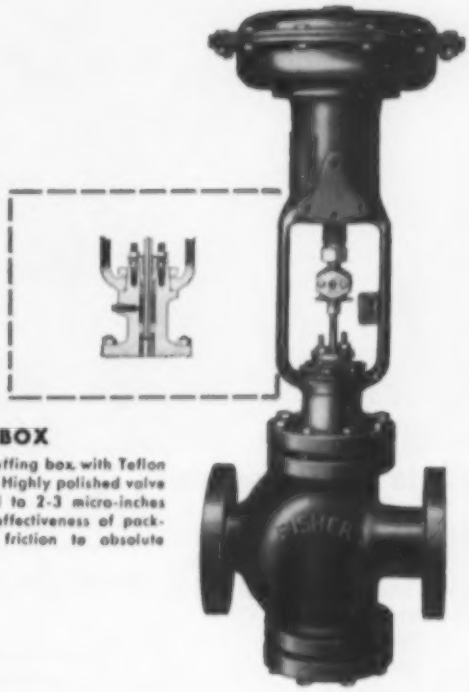
FISHER® Control Valves

are your BEST BET!



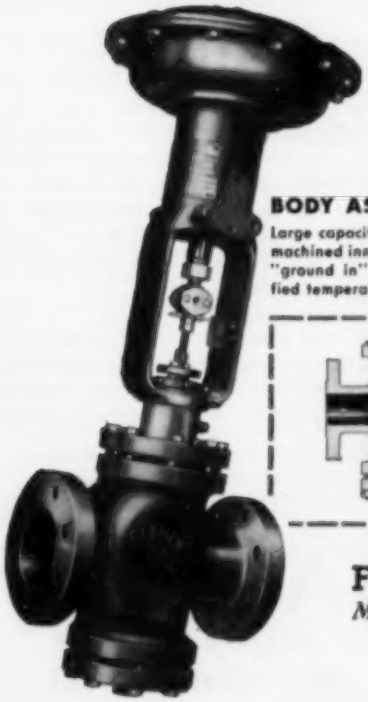
DIAPHRAGM ASSEMBLIES

Extra thick steel casings are zinc electro-plated, iridited and then given prime and final paint coats. Specially designed molded diaphragm with nylon insert gives practically constant effective area throughout valve stroke.



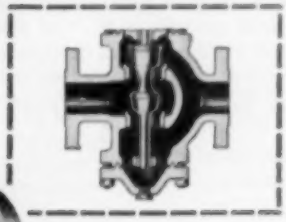
STUFFING BOX

Bolted gland stuffing box with Teflon V-Ring packing. Highly polished valve stem is finished to 2-3 micro-inches RMS to insure effectiveness of packing and keep friction to absolute minimum.



BODY ASSEMBLIES

Large capacity bodies with accurately machined inner valves are individually "ground in" under customer's specified temperature conditions.



Realizing their importance in the control system, Fisher has given careful attention to design and construction of diaphragm control valves. Any way you look at it — from the standpoint of durable construction or accuracy of performance—Fisher Diaphragm Control Valves are your best bet.

FISHER GOVERNOR COMPANY

Marshalltown, Iowa • *Woodstock, Ontario*

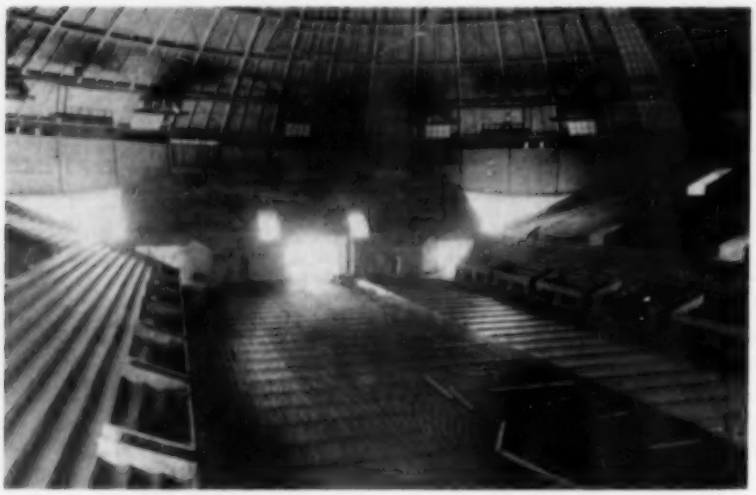
World Leader in Research for Better Pressure and Liquid Level Control

few minutes and drained again. Although no neutralizer was needed with the scale remover, it was necessary to flush the system in this manner to prevent the dissolved scale from reforming.

The hotel manager and engineer both agreed that they desired no recurrence of this condition so Anderson Chemical Company's low cost proportioning feeder system was recommended to apply Coolex (a custom formulated corrosion and scale preventive). This system was easily installed and to date is still operating with the desired results.

Regular analyses are made on the spot by the Anco service engineer (and confirmed by the Macon laboratory) to prevent the possibility of gradual scale formation causing the headaches and expense that it regularly produces.

By J. R. STEM, Service Engineer, Anderson Chemical Company.



Built to Resist Corrosion

FROM ITS DOME—"the largest in the world" — to its underground piping systems, the new $5 million all-purpose Civic Center in Charlotte, N. C., was designed and built for longevity.

Plumbing was installed in the Coliseum by P. C. Godfrey Plumbing and Heating Company and heating was by Hopkins, Hicks and Ingle. Both firms are located in Charlotte. Wrought iron was chosen because of its corrosion resistant and fatigue strength qualities which have proved themselves in many applications over a long period of years.

A total of 17,562 feet of Byers piping—in sizes ranging from ⅛ to 4 inches—was placed in the Coliseum which seats 13,500. Wrought iron was particularly important in the ice rink installation.

The most serious threat to satisfactory rink performance—and often to the financial success of the rink—is the failure of piping due to corrosion.

Wrought iron has a high resistance to corrosion from brine and other agents as well as an ability to withstand acid attack, oxygen depolarization and electrolytic corrosion.

The rink in the Charlotte Coliseum is 202 feet long and 85 feet wide. Wrought iron piping, measuring 1 inch in diameter, was installed lengthwise in the rink—connecting into 4-inch headers running across the ends and supplied by 6-inch mains.

Amreco, Inc., of Minneapolis, Minn., installed the ice rink. The Coliseum was designed by A. G. Odell, Jr. and Associates, Charlotte architects. The mechanical engineering was done by W. P. Wells of Charlotte.

Wider Use of Fuel Oil Additive

RECENT TESTS conducted in a number of industrial plants, including a refinery, and a power plant, have demonstrated that many problems besetting industrial plants, where residual fuel is used can be solved by the use of Du Pont's Fuel Oil Additive No. 2.

The product is a sludge dispersant. It prevents sludge and gummy residue from forming in storage tanks by keeping the millions of tiny particles in the fuel from clustering together and settling to the bottom of the tank. Because the additive keeps the particles small, it prevents the clogging of filters and burner nozzles. When used in large enough quantities and recirculated through the storage tank, it cleans out sludge which may have accumulated, and continued use prevents new sludge from forming.

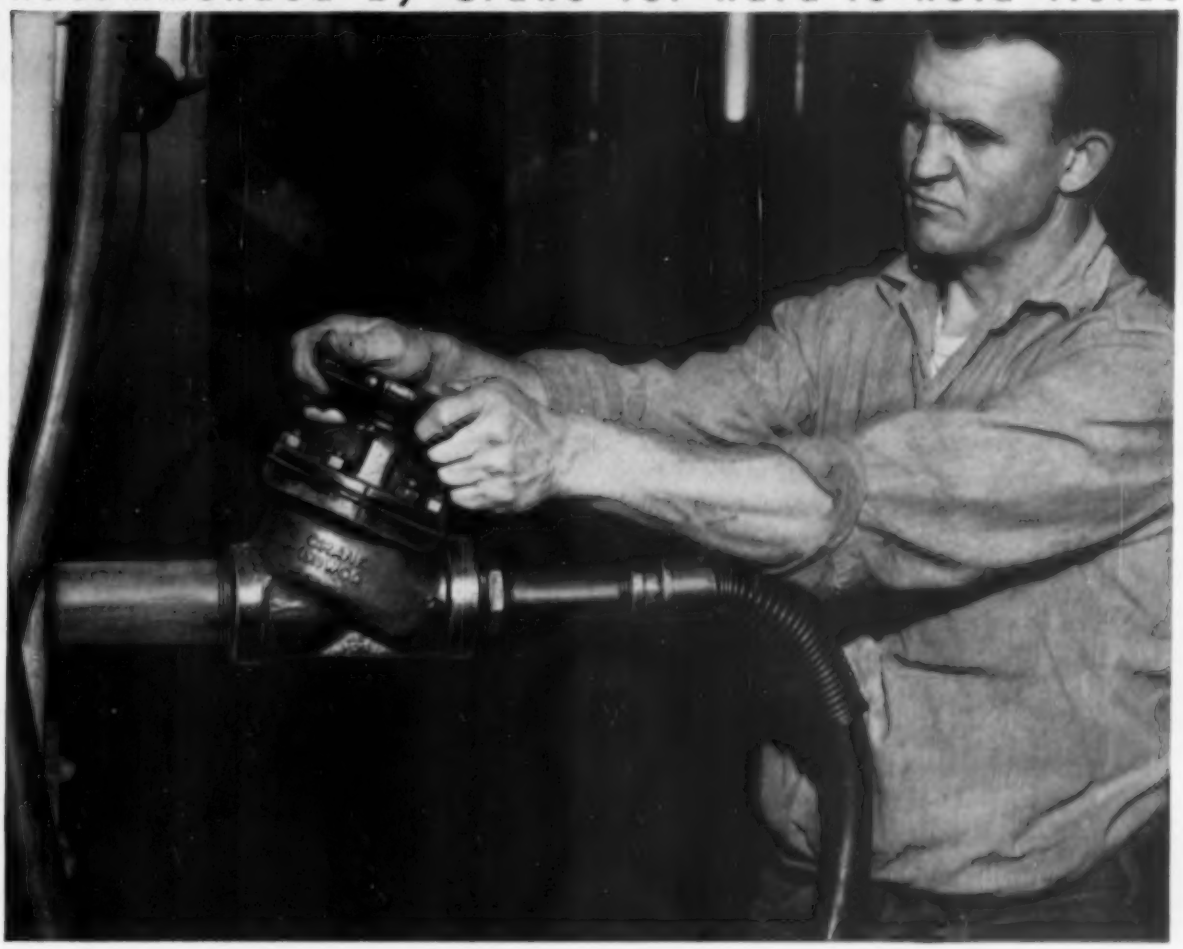
The additive has been used effectively for several years in billions of gallons of light fuel oil. Until the recent tests were completed, however, it had never been used in the heavy industrial oils where the tougher and more costly problems resulting from sludging occur.

A power station, where one of these field tests was conducted, offers a striking example of its effectiveness. The routine procedure was to clean each of the 12,000-gallon storage tanks periodically and the strainers protecting the pump every 48 hours. It was decided to try cleaning the tank with fuel containing the Du Pont additive by circulating the mixture for 48 hours. Afterwards no sludge was found in the bottom of the tank. The strainers which previously had to be cleaned every 48 hours remained clean even after a period of five weeks' operation.

USE SPI READER SERVICE

See Page 121

Recommended by Crane for hard-to-hold fluids



Utility finds these valves ideal for holding transformer oil

Note how clean the valve—not even a sign of oil seepage.

Two years ago, Southern California Edison Co. at its Alhambra shops installed this Crane diaphragm valve on oil refill lines for transformer servicing. Operated about 12 times daily, it has never shown any sign of leakage.

The Utility says they are enjoying exceptional performance with this valve. No troublesome maintenance such as refacing valve seats or repacking stuffing boxes.

Independent seating and bonnet sealing set Crane valves apart from ordinary packless or diaphragm valves. The Crane diaphragm is used only to seal the bonnet—that's why it lasts so much longer. A "soft" insert in the disc face gives tight seating on the hardest-to-hold fluids, liquid or gas.

Ask for this Circular

Moderately priced, Crane diaphragm valves are ideal for many services—common and corrosive. They're made in body materials ranging from iron to stainless alloys. Diaphragm and disc insert available in neoprene, natural rubber, buna N, Kel-F, etc.

Get full information from your Crane Representative or by writing to address below for Circular AD-1942.

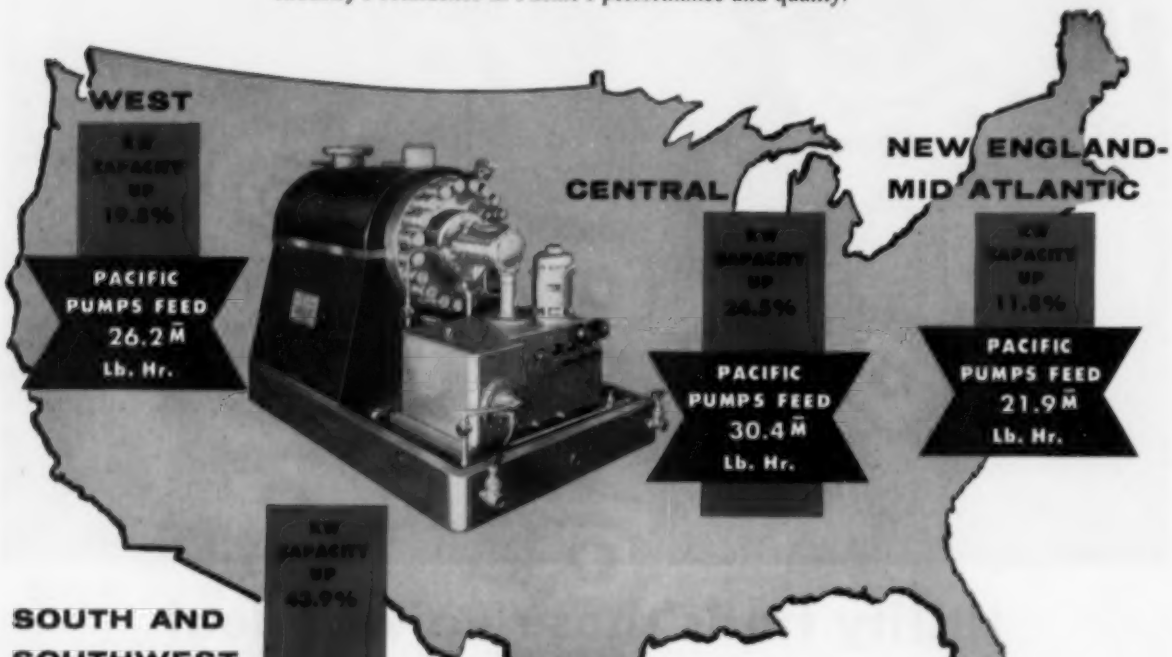
CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

Keeping up with the kilowatts

From 1951 to 1955 the capacity of Pacific high pressure boiler feed pumps installed in each of the four regional areas of the U. S. has kept pace with the increase in electrical generating capacity in each area. This universal acceptance and repeat orders from individual Utilities in each area for 12-15 units express the Industry's confidence in Pacific's performance and quality.


WEST
KW CAPACITY UP 19.8%
PACIFIC PUMPS FEED 26.2 M Lb. Hr.
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KW CAPACITY UP 24.5%
PACIFIC PUMPS FEED 30.4 M Lb. Hr.
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Pacific high pressure boiler feed pumps are preferred for fine new power plants everywhere. They follow the load perfectly from 100% down to trip off. They are efficient—economical to operate and maintain.

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EUTECTIC Welding News

EUTECTIC WELDING ALLOYS

PLANT, RESEARCH LABORATORIES and WORLD HEADQUARTERS

Published by EUTECTIC WELDING ALLOYS CORPORATION 40-40 172nd STREET, FLUSHING 58 NEW YORK, N. Y.

"EUTECTIC" WELDING HEADLINES • TIME-MONEY-MACHINERY SAVERS

XYRON 2-25 REPAIRS RR DIESEL ENGINE SAVES $10,800, WEEKS OF DOWNTIME

A large break in the first cylinder of a 600 horsepower diesel engine almost resulted in the loss of $10,800 by a Midwestern railroad. Attempts to repair the engine with conventional high heat welding materials failed because the block was thoroughly dirt and oil soaked and its tremendous size made pre-heating impossible.

Fig. 1

The railroad's maintenance foreman was ready to recommend scrapping the engine when Eutectic's District Engineer suggested welding with patented Xyron 2-25, "Eutectic's" newest and most advanced electrode for all types of grey and alloyed cast iron. Xyron 2-25 is usable fast and cold and is the first non-cracking, porosity free, all position electrode for cast iron.

Fig. 2

Repair was begun by veeing out all broken surfaces with Eutec-ChamferTrode, high speed gouging electrode for all metals. (Fig. 1) Gouging with ChamferTrode provided a good surface for deposits of Xyron 2-25 and burnt out many of the impurities in the casting. After the broken parts were reassembled on the engine block, Xyron 2-25 was used to tack weld. (Fig. 2).

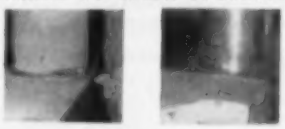
Welding machine was set at 100 amps, DC reversed. The weldor then used a stringer technique with short arc to deposit 2" passes of Xyron 2-25. Peening after each pass relieved stress and slag was easily removed.

Final results were excellent. Xyron 2-25 produced dense, smooth, porosity free deposits at lowest amperages. (Fig. 3) Fast repair with Xyron 2-25 saved railroad $10,800 replacement cost and avoided weeks of downtime. *(A-71)*

HIGHEST STRENGTH JOINTS WITH EUTECTRODE 201

Welded with patented EutecTrode 2101, the aluminum tine joints on this cement block unloader are up to three times stronger than joints of conventional aluminum electrodes. Loads of close to a ton cause the tines to dip as much as eight inches without cracking. EutecTrode 2101 quickly fabricated the block unloader, produced smooth solid deposits with good color match and high resistance to corrosion. The first aluminum electrode with an extruded flux coating, EutecTrode 2101 does not spatter or fume, produces a quiet arc at lowest amperages. EutecTrode 2101 outperforms all conventional aluminum electrodes. *(A-72)*

EUTECTRODE 680 AC-DC AVERTS 10 WEEK STOPPAGE



A Tennessee stamping plant faced an 8-10 week production stoppage because of a cracked shaft on a 340 ton press. Replacement was estimated at $15,000. But downtime was averted and replacement cost saved by using EutecTrode 680 AC-DC and Eutec-ChamferTrode to repair the shaft at a cost of only $37 in materials. Eutec-ChamferTrode, high speed gouging electrode, was first used to vee out the crack, which extended 6" thro gh the 12" shaft. EutecTrode 680, patented high tensile electrode for very high alloy and carbon steels, was then applied. Eutec-Trode 680 welds were applied at lowest amperages. *(A-73)*

In answering industry's requests for technical data, Eutectic's research and engineering staffs help industry save thousands of dollars each year. Your questions, like these below, will be answered without obligation by Eutectic's Technical Information Service.

Q. My company's welding manual makes reference to the use of solder in the repair of lamp socket contacts. EutecRod 157 with Eutector Flux 157 was recommended to us for this application. Will you advise? We would like to incorporate this information in our manual for future use. The fact that this soldering is performed by unskilled personnel should be considered.

A. EutecRod 157 is considered an ideal recommendation. Since this alloy has an extremely narrow plastic range, rapid solidification takes place, assuring a good build-up. It is therefore easier to handle by the unskilled. Deposits are harder and have higher electrical conductivity than conventional solders. This means greater resistances to pitting and general wear. Since the alloy has a higher solidus temperature, the possibility of plasticizing the build-up if accidental arcing occurs is virtually eliminated. Contacts also will remain bright and clean since EutecRod 157 does not contain lead or other elements than darken with age. Melting point is approximately 430° F. Electrical conductivity is 18 percent.

Q. What is the electrical resistance of EutecRods 180, 800, and 1804?

A. Electrical resistivity of all three is almost identical in that values of 23/24 microhms per cubic centimeter are obtained on all tests.

Eutectic Warehouse — Service Centers
446 Northside Drive, N.W., Atlanta 18, Ga.
2204 Irving Boulevard, Dallas 7, Texas

Eutectic Welding Alloys Corporation
40-40 172nd Street, Flushing 58, N.Y.

Gentlemen:

I would like further free information on the following:

☐ A-71 ☐ A-72 ☐ A-73
☐ **Free 170 page pocket Welding Data Book**

Name _____

Business Address _____

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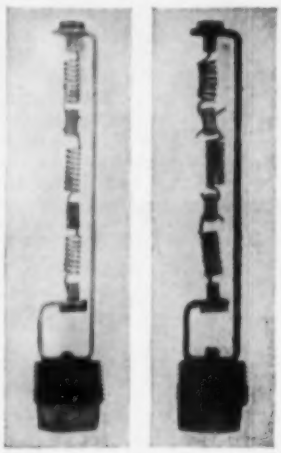
BIRD-ARCHER Amine Treatment
INSURES LONGER LIFE FOR PIPE

Return line corrosion is one of the most critical problems in maintaining economical, efficient power plant operation.

Bird-Archer Amine Treatment is an easy, effective and economical way to eliminate corrosion troubles. Amines raise the pH value of the return condensate to the point whereby the corrosion potential is negative. In addition, amines provide a surface protection for the metal itself which further inhibits corrosion. In scores of plants, Bird-Archer Amine Treatment is paying a profit on its cost through savings in piping replacement and maintenance work.

To demonstrate what corrosion can do in steam and condensate return lines, we show here "before" and "after" unretouched photographs of NDHA Corrosion Testers. This is a test* developed by the American Society for Testing Materials in cooperation with the National District Heating Association. Bird-Archer supplies and analyzes these testers. Photo at left shows a Tester before installation. Photo at right shows a Tester after it had been installed for 60 days in the return line. (*Standard Method of Corrosivity Test of Industrial Water, NDHA Method, ASTM Designation 935-49.)



Write for BULLETIN CP-100 AND THE NAME OF THE BIRD-ARCHER SERVICE ENGINEER NEAREST YOU.

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BA 602

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Equipment, Supplies & Methods (Cont'd)

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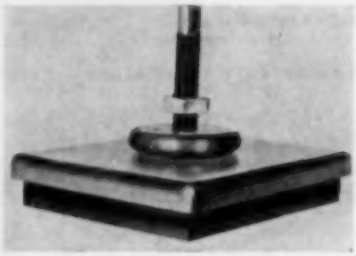


Machinery Mount

E-6 A new self-leveling machinery mount, called the Level-Rite, has been announced by the Unisorb Division of **The Felters Company**, 210 South St., Boston 11, Massachusetts. It consists of an all-steel base unit with leveling screw and leveling plate, combined with special Unisorb Vibration-Dampener Pad.

This new Unisorb Mount is designed in seven models with loading ranges from 800 to 7,500 lb per unit; and in four sizes: 4" x 4", 6" x 6", 8" x 8", 10" x 10". One unit is required for each machine leg or mounting point.

Circulating Oil System

E-7 The **Farval Corporation**, 3249 East 80th St., Cleveland 4, Ohio has announced the development of a new type of circulating oil system to be marketed under the trade-name "Lubrival."

Designed to serve the lubrication needs of presses, automatic and semi-automatic machine tools, etc., Lubrival employs the familiar Farval two-line principle of operation to supply oil under pressure to Progressive Dualine measuring valves for delivery to bearing points. The valves have individual sight indicators and feature the positive piston displacement method of feeding lubricant.

Lubrival monitors its own operation through a pressure sensing mechanism to warn of clogged or broken lines in any part of the system. Circulating oil systems heretofore have failed to provide indication of broken discharge lines. Bulletin No. 70 gives details.

Trane saves $27,000 a year burning coal the modern way

Consult an engineering firm

Designing and building hundreds of heating and power installations a year, qualified engineering firms can bring you the latest knowledge of fuel costs and equipment. If you are planning the construction of new heating or power facilities—or the remodeling of an existing installation—one of these concerns will work closely with your own engineering department to effect substantial savings not only in efficiency but in fuel economy over the years.

facts you should know about coal

In most industrial areas, bituminous coal is the lowest-cost fuel available • Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar • Automatic coal and ash handling systems can cut your labor cost to a minimum. Coal is the safest fuel to store and use • No smoke or dust problems when coal is burned with modern equipment • Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

As part of its current $12 million expansion program at all locations, The Trane Company, La Crosse, Wis., a major air-conditioning and heating equipment manufacturer, has recently modernized its power plant. Steam generating facilities were changed over entirely to a coal-fired operation and a 70,000 lb./hr. boiler was added. Coal and ash handling is automatic.

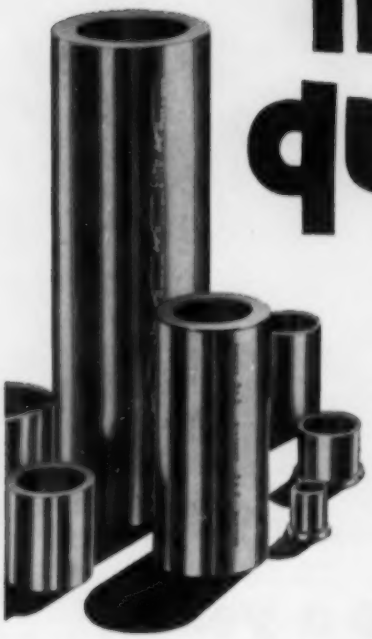
Trane has found that burning coal the modern way pays off in several ways. Overall cost of steam generation is cheaper. Fuel supply is readily available and dependable. And fuel cost savings amount to 25% over the next most economical fuel, totaling about $27,000 a year for the La Crosse plant alone.

For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

BITUMINOUS COAL INSTITUTE
Southern Building • Washington 5, D. C.

YOU GET more* WHEN
YOU BUY BEARINGS FROM
YOUR Bunting® DISTRIBUTOR

* more quality



PRECISION, QUALITY AND COMPLETE FINISHING make possible the simplest and most economical application of Bunting Bearings. Bunting Cast Bronze Bearings and Bars and Bunting Sintered Powdered Oil-filled Bearings and Bars give you components that save time and expense in both production and maintenance operations. Bunting distribution of these stock products through leading, responsible distributors in all areas brings Bunting quality right to your door.

Your Bunting distributor is listed in the classified section of your telephone directory usually under Bars—Bronze, and Bearings—Bronze. Two modern Bunting factories and eleven Bunting Branch Warehouses expedite distribution in all areas. Write, or ask for catalogs giving complete dimensional listings and technical data.

Simplified standardized size listing including all ASTM sizes—an exclusive Bunting feature.

Bunting | BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS OF CAST BRONZE AND POWDERED METAL.

The Bunting Brass and Bronze Company • Toledo 1, Ohio • Branches in Principal Cities

New Equipment (Cont'd)

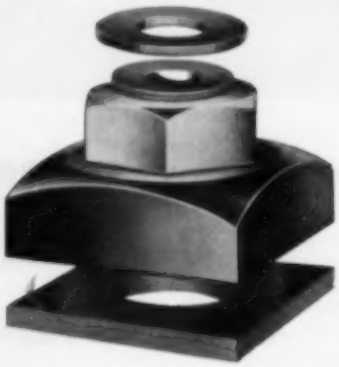
Dehumidifying Compound

E-8 A dehumidifying compound for removing dampness and preventing rust, corrosion and mildew in all types of buildings, is announced by **Speco, Inc.**, 7308 Associate Ave., Cleveland 9, Ohio.

Known as Hum-I-Dri, it is reputed to absorb up to 10 times its own weight in moisture from the air. The Hum-I-Dri unit consists of a bag of activated chemicals suspended on a wire frame above a drainage drip pail.

Leveling Jack

E-9 Style JS leveling jack is offered by **Enterprise Machine Parts Corporation**, 2731 Jerome Ave., Detroit 12, Mich. for easy leveling of machine tools, assembly fixtures, surface plates and other industrial equipment.



The jack safely supports up to twenty tons and raises or lowers easily by means of the adjustable nut. Compensation for floor slope is made by the concave spherical radius in the lift screw and aligning disc which provides adequate "float" and maintains horizontal alignment of the equipment.

Machine vibration and creepage are minimized through the use of special mounting pads — eliminating the need for anchor bolts on many installations. Available in 12 models, ranging in height from 1¾" to 3¾". Leveling adjustment ⅜".

For More Free Data CIRCLE CODE NO. on the Handy Return Card — Page 121

All-welded feedwater heater for new generating station will operate at 3200 psi with inlet steam temperature of 678° F. Designed and fabricated by The Lummus Company, the unit is the first of its kind, is also the biggest heater ever built for operation at pressures above 3000 psi, having 12,710 square feet of tube surface in a single shell.

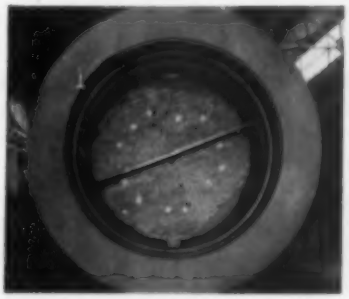
First All-Welded Feedwater Heaters Will Cut Generating Station Maintenance Costs

The first all-welded feedwater heaters ever built have been designed and fabricated by Lummus for the Linden Generating Station of the Public Service Electric and Gas Company of New Jersey. When completed, the installation will include 6 all-welded heaters, designed to operate at pressures well above 3000 psi, and 12 low pressure heaters which were all welded except for the tube to tube sheet joints.

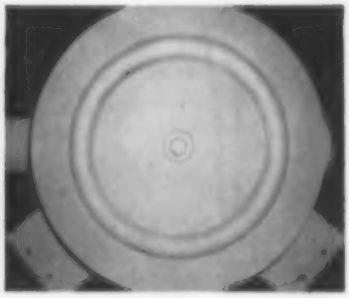
In addition, Public Service has just given Lummus a contract to supply feedwater heater requirements for their new Bergen Generating Station, duplicating in design the Linden units.

Welded construction minimizes leaks in tubes, shell and head. Thus the new units are expected to reduce materially the costly maintenance and downtime associated with failure of seals in bolted and gasketed constructions.

These unique heaters are the end result of over ten years of design and experimental work by The Lummus Company with all-welded fabrication. Perhaps this pioneering can help you reduce maintenance problems, too. For more information write The Lummus Company, 385 Madison Avenue, New York 17, New York.



Ends of cupro-nickel tubes are jointed to steel tube sheet by Inco "140" Monel Ni-Cu alloy electrodes. This alloy fuses well with both tube and sheet materials, forms strong, sound joint.



Closed head shows torus ring seal which is welded to channel and cover. Gasketed joint has been eliminated to avoid possibility of leakage. Design water pressure of unit is 3600 psi.

LUMMUS

HEAT EXCHANGER DIVISION

THE LUMMUS COMPANY, Heat Exchanger Division, 385 Madison Avenue, New York 17, N. Y.
Atlanta • Boston • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • East Chicago (Indiana) • Houston • Kalamazoo • Kansas City • Los Angeles • Memphis • Minneapolis Nashville • New Orleans • Newton (Iowa) • Niskayuna (New York) • Omaha • Pittsburgh Salt Lake City • San Francisco • Springfield (Mass.) • Syracuse • Toledo • Wayne (Pa.) • Athens Buenos Aires • Caracas • The Hague • Lima • London • Mexico City • Montreal • Paris Rome • San Juan

Steam Surface Condensers • Evaporators • Extraction Bleeder Heaters • Steam Jet Air Ejectors Steam Jet Refrigeration • Barometric Condensers • Heat Exchangers for Process and Industrial Use • Process Condensers • Pipe Line Coolers

For more information, use Reply Card—Page 121

Meet the "Little Brother"

. . . he's New in the Warren family

Across the page . . . we present little TS*, the latest addition to the popular line of Warren Screw Pumps.

Like his big brother, IGAB**, he'll lift any noncorrosive liquid—up to 450 lbs. (IGAB goes about 1200 lbs.) And TS is ideal for *heavy* fuel oil services.

He's easy to take care of, too . . . like replacing the rotor by simply sliding a new one through the rear head. No adjustment is necessary.

And best of all—TS will do the job for half the price!

When you have a problem that can be handled by a smaller pump, consider this efficient little Warren TS. It saves on costs, takes up less space, is easy to maintain and guarantees the same pumping satisfaction of all experience-rated WARREN PUMPS.

*Twin Screw
**Internal Gear And Bearing (Quadruple Screw)

WARREN

WARREN PUMPS, INC., Warren, Mass.

G-5

New Equipment (Cont'd)

Adapter Angles Vise

E-10 A new Angle Adapter to permit movement of Gyro-Vises up and down in an arc is announced by **The Columbian Vise & Mfg. Co.**, Cleveland 4, Ohio.

With this adapter, the vise can be placed in any position required by any user. The adapter is also said to greatly increase the versatility of this vise which normally operates from and rotates around a standard base. The Gyro-Vise works equally well in any upright or "on-its-side" position.

The angle adapter is one of several new features of the No. 73½ Gyro-Vise recently introduced. Others include removable and replaceable pipe jaws, 7⅞ sq. in. of jaw gripping area, 3½ in. jaw width and 1¾ in. square polished anvil surface.

Nonflammable Solvents

E-11 Nonflammable solvents that will bite into and remove oil, grease, and dirt without harming delicate metal parts or electrical insulation, yet are safe enough to use in ordinary work areas with conventional ventilating equipment, are now available from **E. I. du Pont de Nemours & Co.**, 7506 Nemours Bldg., Wilmington, Del. to solve a wide range of special industrial cleaning problems.

Adaptable to vapor degreasing or cleaning by liquid immersion, the solvents will be marketed under the "Freon" trademark. Three types, all classified technically as "selective solvents," are available in container sizes ranging from 10 to 55 gallons.

For More Free Data CIRCLE CODE NO. on the Handy Return Card — Page 121

Fluxless Aluminum Solder

E-12 Wider use of aluminum in handsawable tubes, bars, shapes, etc., is foreseen in a fluxless aluminum solder announced by **All-State Welding Alloys Co., Inc.**, 249 Ferris Avenue, White Plains, New York.

Characteristics of the new solder include: high strength — to 20,000 psi tensile in a mitered joint, lead free, no galvanic action between solder and base metal, good color match with aluminum, and low-skill applicability with any form of heat that will raise the temperature to 720 F, at which point the alloy flows freely.

Designation is No. 55 Rubbon Aluminum Solder. The alloy is to be rubbed on without a flux.

Best bond is obtained by simply heating the cleaned base metal enough so the solder melts when it is rubbed on the surface. This thoroughly tins the surface. Joining is accomplished by heating two tinned surfaces held firmly together.

Degreaser Spray

E-13 Grease, oil, carbon, tar, gums and similar difficult to remove substances can now be easily, quickly and safely removed by a new aerosol degreaser, Zipp, that is designed for use on all types of machinery and electrical equipment by **Stewart-Hall Chemical Corp.**, Box 66, Mount Vernon, N. Y.

Simply spray Zipp on the area to be cleaned and within a minute you can either wipe the object clean with a rag, or, if not electrical, hold it under a water faucet and rinse it off.

I'm "Little Brother TS"

... the *newest* Warren Screw Pump

TS* is the name. And just compare TS's capabilities with big brother IGAB's:**

	TS	IGAB
Capacity	to 600 gpm	to 4000 gpm
Pressure	to 450 psi	to 1200 psi
Viscosity	to 150,000 ssu	to 150,000 ssu
Speed	to 3000 rpm	to 1750 rpm

There are many pumping jobs that Warren's dependable little TS can do just as well as a pump costing twice as much. Get all the details now. Just fill out and mail the coupon below.

*Twin Screw
**Internal Gear And Bearing (Quadruple Screw)

G-5A

WARREN PUMPS, INC., Warren, Mass.

Gentlemen:

Please send me complete information on "TS"—Warren's newest screw pump.

Name and Title .....

Company .....

Address .....

City ..... Zone ..... State .....

☐ PLEASE HAVE YOUR REPRESENTATIVE CALL.

A dangerous place to work...

that's why you see so many symbols of safety

Here's a plant that's out to keep "employee downtime" at a minimum. Extinguishers and gas masks provide protection against fire and toxic fumes. Guard rails and chains surround permanent hazards. Raised steel strips around floor openings prevent objects rolling or being kicked to the floor below. Clean windows and bright lighting provide good visibility. It's only natural that a company so interested in safety should select Blaw-Knox Steel Grating for "underfoot" safety.

Each section of Blaw-Knox Electroforged® Steel Grating is of rigid, one-piece construction, with a choice of cross bar and bearing bar surface designs and spacings that afford maximum safety under all working conditions. Indoors or out, you get safe, quiet, long lasting and self-cleaning flooring with maximum passage of light and air.

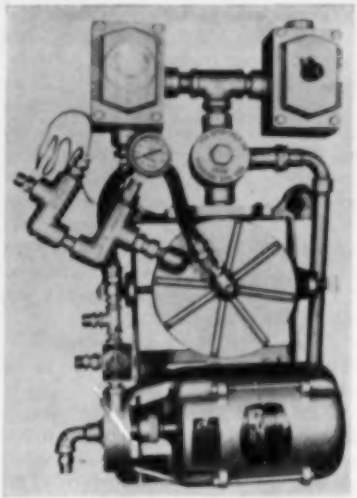
Blaw-Knox Electroforged Steel Grating is fabricated in a wide selection of materials to exact customer specifications. Fits easily and neatly into even the most congested areas.

Send for new Blaw-Knox Grating Catalog 2527
See new ideas in flooring, walkways, stair treads, platforms, shelving. Write today.

BLAW-KNOX

BLAW-KNOX COMPANY
Blaw-Knox Equipment Division, Dept. K, Pittsburgh 38, Pa.

New Equipment (Cont'd)



Hot Spray Heaters With Dial Temperature Controller

E-14 **The Spee-Flo Co.**, 720 Polk Avenue, Houston 2, Texas, manufacturers of hot spray equipment for industry, have introduced the Viscomatic — an external dial temperature controller for their hot spray heaters.

Any desired temperature in a 90 to 170 F range can be dialed externally and controlled within a plus or minus two degrees. The Viscomatic is explosion proof and is factory installed with the required heater.

The introduction of many new finishing materials with varying temperature level requirements has increased the demand for easy temperature adjustment on hot spray equipment. Temperature variation from 150 F to 170 F produces little or no viscosity change. At levels below 150 F, however, temperature changes cause marked differences in viscosity. With the Viscomatic, correct operating temperature for the material in use can be dialed.

Spee-Flo Circaflo models (illustrated) maintain a constant hot spray material temperature at the gun. Efficient centrifugal pump recirculates material from heater to gun and return. Units are available in single or dual models, capacities of 7.5 to 15 gallons per hour.

For More Free Data CIRCLE CODE NO. on the Handy Return Card — Page 121

Filler Cans

E-15 A new-style line of completely redesigned galvanized oil and gasoline filler cans ideal for mill, factory, and general industrial use has been introduced by **Eagle Manufacturing Co.**, 2553 Charles St., Wellsburg, W. Va.

The dome-shape shell prevents water and dirt from settling on top. The new line of cans is available in 1, 2, 2½ and 5-gallon sizes.

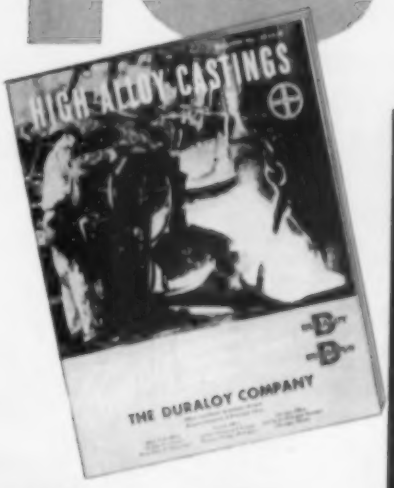
Tube Expanding

E-16 A dial incorporated into the Model C Torq-Air-Matic, a new air-powered tube-expander drive and control developed by **Thomas C. Wilson, Inc.**, 21-11 44th Ave., Long Island City, New York, provides the control necessary for precise boiler-tube rolling.

The operator has but to set the desired torque (in foot-pounds) on the dial and start the rolling operation; when the desired torque is obtained, the expander automatically stops rotating. Joint tightness is always uniform, regardless of tube-sheet hole variation. Guesswork is taken out of tube expanding because the operator does not have to depend on expander resistance, motor sound, or "feel" to determine correct expansion.

The Model C is designed for a wide range of boiler tubes, from 1 to 2½ inches O.D. It produces 75 foot-pounds of torque, powerful enough to roll 3-inch No. 10-gage tubes in a ⅝-inch-thick sheet. It is a completely integrated one-piece device.

16 pages of useful information about



HIGH ALLOY CASTINGS

DURALOY DURASPUN

This is our New General Bulletin—3354G. It's full of information and data on the chrome-iron and chrome-nickel castings so necessary when corrosion, high temperatures and abrasion must be resisted. It will serve as a general selection guide for those specifying or using such castings.

The bulletin also reviews briefly our experience in both static and centrifugal castings, an experience going back to the pioneering days of 1922 and 1933 respectively. It also tells about our facilities for furnishing castings to any desired analysis, welding, X-ray and gamma ray testing, metallurgical and foundry control.

The DURALOY Company

OFFICE AND PLANT: Scottdale, Pa.

EASTERN OFFICE: 12 East 41st Street, New York 17, N. Y.
ATLANTA OFFICE: 76—4th Street, N.W.
CHICAGO OFFICE: 332 South Michigan Avenue
DETROIT OFFICE: 23906 Woodward Avenue, Pleasant Ridge, Mich.

Write or call our ATLANTA OFFICE: 76—4th Street, N.W.

Here's how you can SAVE MONEY
on VALVE INVENTORY
on COSTLY VALVE MAINTENANCE
on PRODUCTION LOSSES due to leaky valves . . .

POWER-DRIVEN
ONE-MAN OPERATED
Dexter
VALVE-IN-LINE
RESEATERS*
will enable you to set up an effective valve maintenance program

FOR GATE TYPE VALVES
Dexter Gate Valve Reseaters are power driven through a chain and sprocket transmission. Grinding head located on a universal joint automatically seeks and holds the plane of the valve seat, regardless of its angle. Size range: 1" thru 12".

FOR GLOBE VALVES
Dexter Globe Valve Reseaters are power driven thru spindles mounted on radial and thrust bearings. Valves are ground from valve manufacturers' reference points. — Grinding heads for all angles. Sizes: ¼" thru 12".

ADVANTAGES

- Will grind stainless steel, stellite.
- Grind any valve seat, globe or gate type, regardless of its angle.
- Grind any valve in line regardless of its location, and if accessible.
- Grind a perfect seat in an average grinding time of 4 minutes.
- Reseat in the line 3 to 4 valves in less time than it takes to remove, cut, lap, replace one valve.
- Save up to 400% in man-hours.
- Perfect for welded-in valves.

**Dexter Valve-In-Line Power Driven Reseaters Replace Former Hand-Operated Dexter Valve Reseaters.*

For More Information Use This Coupon

THE LEAVITT MACHINE COMPANY
Orange, Mass.

Dept. A — Dexter Valve Reseater Division
We repair (No.) _____ valves per year
Size range of repaired valves _____.
☐ Please have your representative call on me
☐ I would like to see your 17 minute movie (16mm)
☐ Just send me more information

NAME _____
TITLE _____
COMPANY _____
CITY _____
STATE _____

New Equipment (Cont'd)

Pipe Cutting Tool

E-17 A new Rigid tool, designed for easier and better pipe cutting with a power drive, is now available for heavy duty use following introduction of the No. 202 Wide-Roll Cutter by **The Ridge Tool Company**, Elyria, Ohio.

Extra wide roll built into the 202 cutter features double the bearing surface on pipe. New wide-roll sets and holds revolving pipe at a perfect right angle. The user is thus assured of quick, clean starts for perfect tracking and straight cuts. Time consuming changes to special rolls are not necessary.

Larger screw handle assures easier cutting adjustment for hand or power use. Extended shank protects screw threads from damage by power drive support bar and gives greater thread bearing surface for easy turning into the pipe cut.

Concrete Drilling Machine

E-18 **Beaver Products Inc.**, Somerset, Ky., announces a new highly efficient, portable, concrete drilling machine for

drilling holes in reinforced concrete, brick tile, marble, granite, and asphalt, or any hard masonry material.

"The Eager Beaver" drilling machine will drill clean holes up to 4 in. in diameter and up to 18 in. or more in depth at the cutting rate of up to 2 in./min. This machine will drill either horizontally or vertically and is powered by merely plugging into any 110 volt circuit.

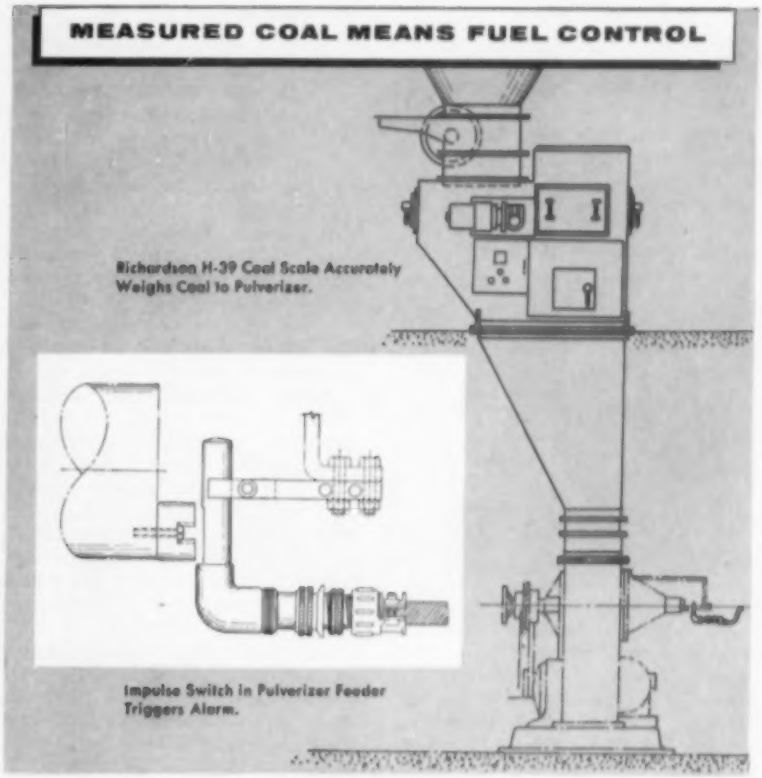
Combination Welders

E-19 **The Lincoln Electric Company,** Cleveland 17, Ohio has added two new welders to its line of Idealarc combination AC and DC welders — 180 ampere and 250 ampere capacity units.

They are designed to meet the needs of job shops, sheet metal shops, light production welding and maintenance welding.

The machines operate equally well either as an AC transformer type welder or a DC rectifier type welder. A switch on the front panel changes the welder from AC operation to DC positive or DC negative. The "two-in-one" feature enables operation of all types of manual electrodes, including stainless and alloy rods. The units are also available as straight AC machines, without DC, to which the DC rectifier can be readily added at a later date, if desired.

The new welders will make available for the first time, to shops having only single phase power, the full versatility of both AC and DC welding.


MEASURED COAL MEANS FUEL CONTROL
Richardson H-39 Coal Scale Accurately Weighs Coal to Pulverizer.
Impulse Switch in Pulverizer Feeder Triggers Alarm.

New Richardson
Coal-Alarm System Protects Against Coal Supply Failure

Here's another Richardson value—a fool-proof, time-proof, load-proof protection against a possible shortage of fuel supply to the pulverizer! Located in your pulverizer feeder, the Richardson Coal-Alarm System sounds a warning if the coal supply runs low or arches anywhere. It's added insurance to keep your boilers firing!

Used with the familiar Richardson H-39 coal scale which accurately weighs your coal as it comes from the bin, the coal-alarm is tied in with the pulverizer feeder shaft. It counts the revolutions of the shaft, determines if the scale discharges before a pre-set number of revolutions is reached. If discharge is late, fuel supply is inadequate and a warning horn sounds. Full protection is afforded during peak and slack loads without adjustment.

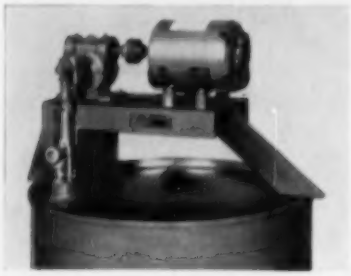
The heart of the Coal-Alarm System is the magnetic impulse switch which transmits electric current to the counter. Laboratory tests on this switch have exceeded fifty million cycles *without failure of any kind.* A control panel houses microflex counter, alarm light, main control switch and test run switch. For full information on Richardson systems for fuel control through measurement, write today. Or call the Richardson office nearest you.

Richardson
MATERIALS HANDLING BY WEIGHT SINCE 1902

RICHARDSON SCALE COMPANY, CLIFTON, NEW JERSEY
Atlanta • Boston • Buffalo • Chicago • Cincinnati • Detroit • Houston • Memphis • Minneapolis
New York • Omaha • Philadelphia • Pittsburgh • San Francisco • Wichita • Montreal
Toronto • Havana • Mexico City • San Juan • Geneva, Switzerland • Nottingham, England

Portable Barrel Pump

E-20 A new controlled volume pump for barrel head mounting has been added to the line of flow metering pumps manufactured by **Milton Roy Company**, 1300 E. Mermaid Lane, Philadelphia 18, Pa. The barrel pump meters toxic or corrosive chemicals from upright, 55-gallon barrels against pressures to 100 psi.



Available in maximum capacities from 500 milliliters per hour to 4 gallons per hour, the portable barrel pumps have constant speed, 1/3 hp, 115-volt, 60-cycle motors. Capacities are adjustable from zero to maximum.

Belt Installation Aid

E-21 A fast, easy way of installing conveyor belts—with the Far-Pul Belt Clamp—4607 Lexington St., Chicago 44, Ill. It does the job much quicker than was heretofore possible and with far less effort.

The equipment is light in weight and employs fast-acting jacks in place of slow, unwieldy take-up screws. Belt downtime is reduced to a minimum.

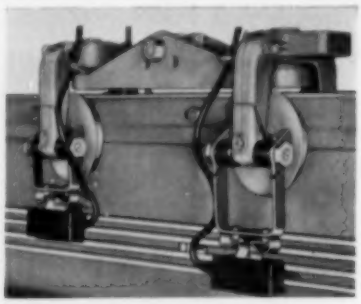
Here's how the time-saving Far-Pul works. Each end of the belt is clamped between bars, one set of which is equipped with jacks and tensioning rods — see photo. The tensioning rods are slipped over studs on the opposite bar clamp. The ends of the belt are drawn together by the jacks. When fasteners mesh properly, pin is inserted through loops of lacing or fasteners. Tension on jacks is released, clamps are removed from belt and belt is ready to operate.

This belt clamp is easily operated by one man, a wrench is the only tool needed. It pulls to fractions of an inch and keeps belts in perfect alignment. Details in Bulletin FP-1.

Shielded Electrification for Monorail Systems

E-22 By covering its standard bus bar electrification with a specially designed polyvinyl chloride extrusion, **American MonoRail Co.**, 13107 Athens Ave., Cleveland, Ohio, now furnishes completely safe electrified systems.

Under the name "Kant-Shock" this shielding absolutely prevents accidental contact with live bus bars. It is impossible for an adult's finger to enter the shield.



A new type sliding shoe collector provides a floating contact throughout a monorail system regardless of misalignment due to bent bars or at switches and interlocks.

Kant-Shock shielded electrification is mounted in stamped bracket assemblies for live power feed throughout the system at a maximum rating of 600 volts—100 amps. It can be applied in the field, where headroom permits, to existing American MonoRail systems.

For More Free Data CIRCLE CODE NO. on the Handy Return Card — Page 121

SHOP TIP

For an Easier Way to Remove Packing

Here is a rugged, flexible, hand-tool that "works around corners" for removing old packing from stuffing boxes. The picture above shows how Dura Hooks operate around obstructions. All steel — tempered steel cork-screw bit — made in 6 sizes — nominal in price.

DURA HOOKS

Ask your jobber—or write for DURA HOOK Bulletin No. SPDH covering sizes and prices.

The PERFECT SEAL

DURAMETALLIC CORPORATION

KALAMAZOO MICHIGAN

Rapid Valve Reseating

E-23 A new power driven valve-in-the-line reseater for modern hard seat valves, gate or globe type, is announced by **The Leavitt Machine Co.**, Orange, Mass.

The new Dexter valve reseaters are both pneumatically or electrically powered. Instead of cutters, special abrasive cloth grinding elements applied to rubber coated grinding heads make possible a rapid application of a new precision valve seat. Manufacturer states that in some cases a single reseating can pay for the tool.

Other benefits include reductions in valve inventories, and substantial cut in valve maintenance costs.

New Equipment (Cont'd)

Multi-Purpose Grease

E-24 A new multi-purpose grease with an improved lithium base engineered to meet nearly all industrial lubrication requirements is now available from **Gulf Oil Corporation,** 1822 Gulf Building, Pittsburgh 30, Pa.

The new product — Gulfcrown Grease — is designed to provide superior lubrication under conditions which often require a variety of special greases — high and low temperatures, the action of water, high-speed bearing action, and long storage.

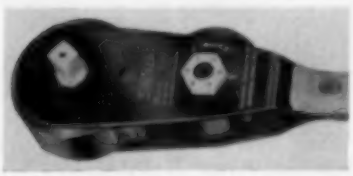
The single-product multi-purpose grease reduces errors in application, cuts lubrication costs, reduces the number of grease guns needed, and simplifies problems of storage, handling, and inventory.

Four quality features are claimed for the new lubricant:

1. High oxidation stability which provides longer life both in use and in storage.
2. High mechanical stability which keeps the grease from thinning and running out of bearings.
3. High resistance to the washing action of water which provides continued lubrication under the dampest conditions. It also provides effective protection against rust.
4. Ready flow in cold weather.

These four features mean greater protection for the equipment and longer periods between applications.

The new grease, which is available in four consistencies, can be applied equally well by grease guns or through a centralized lubrication system.



Hand Operated Impact Wrench

E-25 The "Swench" is a manually operated impact wrench developed by the **Swenson Engineering Company,** Box 43, Branford, Conn. It has the ability to deliver torque values up to 20 times

Continental conveyors from stock!

Including

IDLERS OF ALL TYPES

Bucket and Screw Elevators

All Conveyor Accessories

Belt, Screw and Apron Conveyors
Plate or Apron Feeders
Power Transmission Equipment
Trippers Belt Brushes Pulleys
Sprockets and Chain Pillow Blocks
Belting Speed Reducers

Let us know your needs!

CG-5703

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA

CGC ATLANTA CLEVELAND DALLAS KNOXVILLE MEMPHIS MOBILE NEW YORK 17

that applied to the handle, allowing single operator to manually tighten to practical tensions.

Tool has two drive extensions, one for loosening and one for tightening. It is operated like an ordinary ratchet wrench, using standard sockets. As handle is pulled, a spring and rotor mechanism delivers rotary hammer blows or "impacts" automatically thru socket to the fastening.

Three models are available — Model 500 fits ½" sockets; Model 750 fits ¾" sockets; and Model 1000 is designed for 1" sockets.

TO INHIBIT DERMATITIS

AND OTHER SKIN AILMENTS

A MUST in every shop wash room and on-the-job locations

Foreign soils disappear and skin ailments and dermatitis are inhibited when you use VI-LAN, the remarkable skin cleanser — powered with Actamer, product of Monsanto Chemical Co. to reduce skin bacteria as much as 97%.

VI-LAN does what soaps or powders can not do. It cleanses and disinfects hands, face and body against skin contaminations. Used WITH OR WITHOUT WATER. It removes greases, oils, paints, tars, acids, printing inks, asphalt, pipe dope, rubber, gasket cement, etc., and protects you against lost man hours and annoying compensation claims. VI-LAN contains lanolin to restore natural skin qualities.

For convenient filling of dispensers VI-LAN comes to you in polyethylene bags, thru which you may dispense as much as is needed without waste.

Write for descriptive folder

DAMERON enterprises, inc.
427 So. 20th Street
Louisville 3, Kentucky

Floor Maintainer

E-26 An exceptionally lightweight floor maintainer (weighs 31 lb) has been introduced by **Clarke Sanding Machine Company**, Muskegon, Michigan.

It is equipped with a new 1/3 hp constant duty motor and has interchangeable attachments for waxing, scrubbing, polishing, steel wooling and buffing.

For More Free Data CIRCLE CODE NO. on the Handy Return Card — Page 121

Spray Gun Receiver Prevents Paint Clogging

E-27 Clogging due to paint hardening in the nozzle of spray guns between operating periods is prevented when the gun is placed in the Spray Gun Receiver of **Protectoseal Co.**, 1920 So. Western Ave., Chicago 8, Ill. Paint spray guns are always ready for instant use, regardless of the

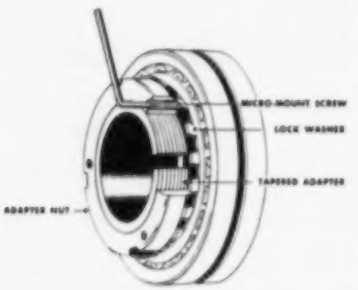
time lapse between operating periods; and the necessity of daily gun cleaning is eliminated.

The new Paint Spray Gun Receiver keeps the nozzle tip of the spray gun in a solvent solution when not in actual use to prevent the paint from hardening to close the opening. Only the nozzle tip is in the solution and the packing is kept away from liquid and vapor so that it is not affected in any way.

Single gun receivers are located in the position most convenient to the operator without interfering with other operators. Multiple gun receivers are also available. There is considerable dimensional variance in the spray guns manufactured by the leading companies and in ordering it is necessary to give the name of the maker, model number and air cap number.

Pillow Blocks

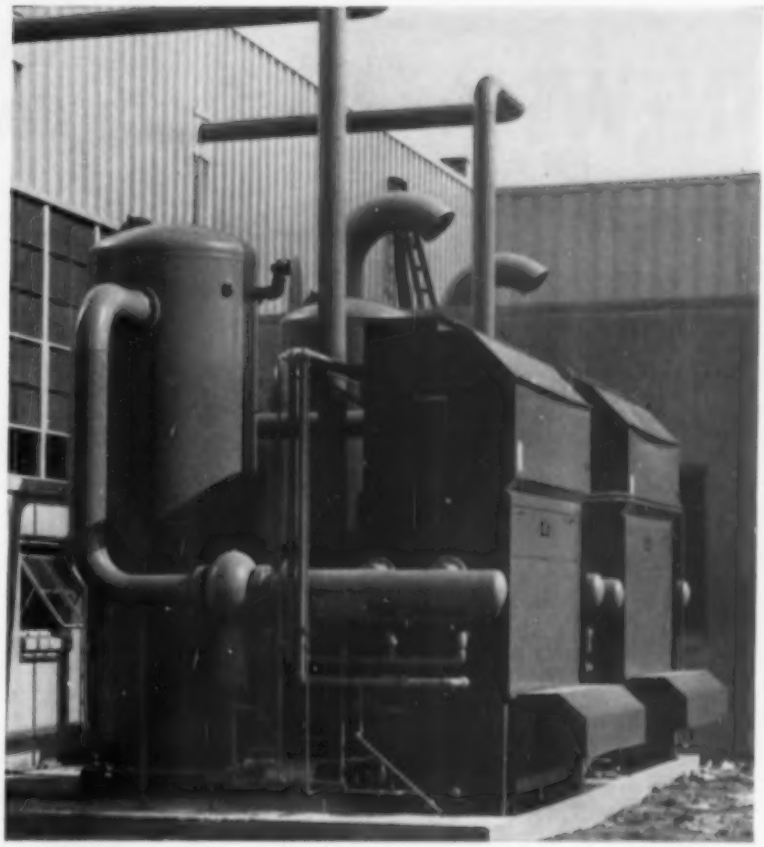
E-28 A new line of spherical roller bearing pillow blocks (Spher Align), incorporating a unique mounting feature, is announced by **Dodge Manufacturing Corporation**, Mishawaka, Indiana.



Fast and accurate mounting — adapter is snugged up with the adapter nut. Mounting is completed by turning the micro-mount screws against the locking washer until bearing adapter and shaft form interval unit.

The new mounting feature, called Micro-Mount, makes it possible to seat Spher-Align bearings solidly on shafts quickly and easily. This is accomplished through the use of set screws located parallel to the bore in the adapter nut.

The new pillow blocks are recommended for applications in which self-alignment and ease of installation and maintenance are desirable. Bearings are offered in both expansion and non-expansion types and are stocked in sizes to fit shafts from 2-7/16" to 8" diameters.



This Niagara Aero After Cooler also cools compressor jacket and intercooler water.

COMPRESSED AIR...Lower in Cost Dependably Drier and Cooler Trustworthy for Instrument Use

THE NIAGARA *AERO* AFTER COOLER offers a completely self-contained method replacing both shell-and-tube cooler and cooling tower. It is independent of a large supply of cooling water and consistently reduces compressed air temperatures to below ambient. Its drier air gives you a better operation and lower costs in the use of all air-operated automatic instruments, tools and machines, paint spraying, sand blasting and moisture-free air cleaning.

Direct saving in the cost of cooling water saves the price of the Niagara *Aero* After Cooler in less than two years. Water saving also means less expense for piping, pumping, water treatment and water disposal, or you get the use of water elsewhere in your plant where it may be badly needed.

Niagara *Aero* After Cooler assures all these benefits because it cools compressed air or gas below the temperature of the surrounding atmosphere; there can be no further condensation in your air lines. It condenses the moisture by passing the air thru a coil on the surface of which water is evaporated, transferring the heat to the atmosphere. It is installed outdoors, protected from freezing in winter, proven in service on the largest plant utility air systems.

Write for complete information; ask for Bulletin No. 130

NIAGARA BLOWER COMPANY

Over 35 Years of Service in Industrial Air Engineering

Dept. S.P.-5 405 Lexington Ave. New York 17, N. Y.

District Engineers in Principal Cities

NEWS *for the South and Southwest*

American-Standard

John C. Linsenmeyer recently elected an executive vice president, operations, of **American-Standard,** will be in charge of a group of operating divisions producing industrial and engineering products. They produce industrial and commercial air conditioning and air handling equipment, power plant equipment, fluid drives, nuclear reactors and components, heat exchangers, steel boilers, valves and electronic and automatic controls.

Mr. Linsenmeyer formerly was president of the American Blower and Ross Heat Exchanger Divisions of the corporation. He is succeeded by **John W. Brennan,** who was named president of the American Blower Division, and **Richard S. Reade,** who was appointed president of Ross Heat Exchanger Division.

Jenkins—South & SW

W. A. Snellgrove has been promoted to Assistant Branch Manager of **Jenkins Bros.** in Atlanta. In this capacity, he will cover work in the states from Virginia through Texas.

Mr. Snellgrove is a Mechanical Engineer and a graduate of Georgia Tech, and has been with Jenkins Bros. since 1938.

Sam L. Hubbs has been employed as a representative for Jenkins valves to cover the **Atlanta-Birmingham** territory formerly worked by W. A. Snellgrove.

Mr. Hubbs comes to Jenkins from General Electric Company in Cincinnati, Ohio. He is a graduate of Georgia Tech, and was previously employed as an Engineer for Aro, Incorporated at Tullahoma, Tennessee, and Powers Regulator Company in Greensboro, North Carolina.

W-K-M Plug Valves—East

W-K-M Manufacturing Company, Houston, Texas, a division of ACF Industries, Incorporated, has appointed **Wendell Grier** as Eastern Sales Representative for the ACF lubricated plug valve department. He will headquarter in Baltimore, Maryland, serving eastern Pennsylvania, Delaware, Maryland, and Virginia.

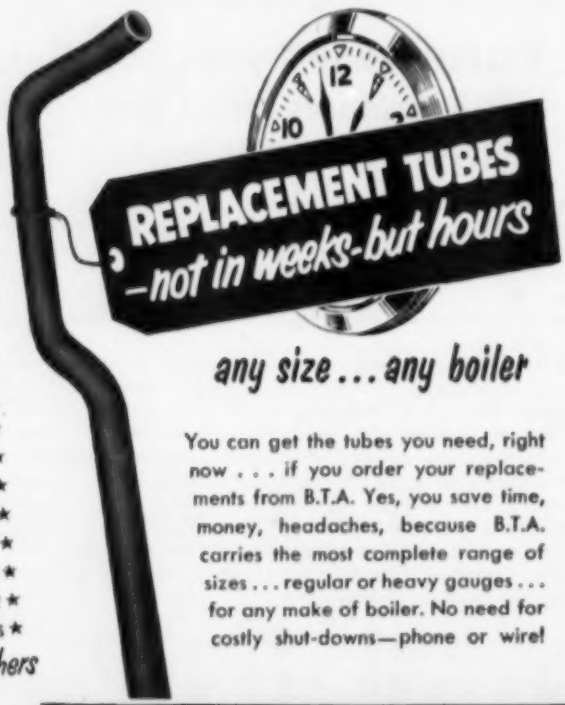
Before coming with W-K-M, Mr. Grier was with the Bethlehem Steel Company for fifteen years as a buyer of valves and heavy industrial equipment.

W-K-M, with ultra-modern fabricating facilities at Missouri City, Texas, manufactures through conduit gate valves, lubricated plug valves, return bends and fittings for the oil, gas and process industries.

Olin Mathieson Purchases Southern Electrical Corp.

Olin Mathieson Chemical Corporation has completed negotiations for purchase of the assets of **Southern Electrical Corporation,** Chattanooga, Tenn., a manufacturer of aluminum wire and cable. The purchase is subject to the approval of Southern Electrical stockholders. Southern Electrical will be operated as a part of Olin Mathieson's Aluminum Division.

for
BIGELOW ★
BADENHAUSEN ★
CASEY HEDGES ★
CONNELLY ★
COMBUSTION ★
COLLINS ★
EDGEMOOR ★
ERIE CITY ★
HEINE ★
FOSTER WHEELER ★
KIDWELL ★
KEELER ★
LADD ★
MAXIM ★
ROSS ★
RUST ★
SPRINGFIELD ★
STIRLING ★
TITUSVILLE ★
UNION IRON WORKS ★
VOGT ★
WICKS ★
and others



REPLACEMENT TUBES
—not in weeks-but hours

any size . . . any boiler

You can get the tubes you need, right now . . . if you order your replacements from B.T.A. Yes, you save time, money, headaches, because B.T.A. carries the most complete range of sizes . . . regular or heavy gauges . . . for any make of boiler. No need for costly shut-downs—phone or wire!

BOILER TUBE CO. OF AMERICA
McKEES ROCKS, PA. (Pittsburgh District) Federal 1-7750

2B

L. B. Foster—Atlanta

Two additions have been made to **L. B. Foster Company's** Atlanta office staff.

William Hundley, Jr. & Edwin Webster

William B. Hundley, Jr., has joined the sales force. For the past six years he was a warehouse steel salesman in Atlanta and Toledo, Ohio.

Edwin E. Webster has been appointed head of the order department. In that capacity he will schedule shipment of orders, supervise the billing department and have responsibility for inventory control. He had been in the freight traffic department of the Southern Railway System for four and one-half years.

L. B. Foster Company is a national distributor of pipe, steel sheet piling, and rail and track accessories.

Hathaway Instrument Expands Operations

The Hamilton Watch Company's **Hathaway Instrument Division** is now located in its new ultra-modern 45,000 sq ft plant at 5800 East Jewell Avenue, Denver, Colorado. New facilities include complete engineering laboratory, manufacturing plant and two-story administrative offices.

Hathaway develops and constructs special instruments for measurement or control — oscillographs, galvanometers, transducers and strain gage control units, computers, vibration detectors, etc.

Hathaway's automatic oscillographs are used for recording unanticipated transients, such as faults in power systems. Full automatic and high-speed starting, these instruments provide complete records of all abnormal conditions, revealing system performance under fault conditions. They also record synchronizing power and the operation of relays and circuit breakers. The oscillographs are designed for panel installations.

Here's
THRIFTY
COOLING
for large areas
EMERSON-ELECTRIC
Air Circulators
FOUR TYPES OF MOUNTING AVAILABLE
For counter mounting
For ceiling mounting
For wall mounting
For floor mounting
✓ Low Initial Cost ✓ Low Operating Cost
Emerson-Electric Air Circulators create cooling breezes in plants, laboratories, kitchens and recreation areas . . . make working conditions more pleasant.
Specially designed for large areas . . . ruggedly built for continuous operation . . . efficient, silent and economical to operate. Deep-pitched, balanced blades are driven by Emerson-Electric two-speed motor . . . fully enclosed and prelubricated for approximately 6000 hours operation.
Get complete details about Emerson-Electric Air Circulators TODAY! Write for Bulletin No. 2018, The Emerson Electric Mfg. Co., St. Louis, Mo.
Direct-Drive Exhaust Fans
Remove stale air, steam and odors from your building. Step up efficiency, cut down labor costs . . . install Emerson-Electric Direct-Drive Exhaust Fans.
EMERSON-ELECTRIC
OF ST. LOUIS
SINCE 1890

LOVEJOY

Variable SPEED PULLEYS

SELECT-O-SPEED TRANSMISSIONS

Save You Money

HERE'S WHY:

- ECONOMICAL IN COST compared to other variable speed transmission equipment. Simple in design but rugged in construction to give you long dependable service.
- EASILY INSTALLED on new or old equipment. Just as easy to operate. Finger-tip adjustment gives the right speed instantly.
- MAINTENANCE IS NEGLIGIBLE. No complicated mechanisms to get out of order. All parts can be readily inspected. Belts can be quickly adjusted or replaced.

Lovejoy Variable Speed Pulleys

are available in a complete range of sizes from fractional to 15 hp., ratios to 3 to 1.

Shown is a typical Lovejoy countershaft unit controlling speed of automatic spring coiler.

Lovejoy Select-O-Speed Transmissions

can be supplied with hand wheel or lever control. Fractional to 5 hp., ratios to 10 to 1.

This Lovejoy Select-O-Speed is used to control the speed of a printing press.

REPRESENTATIVES:

ALABAMA: Birmingham—125 N. 41st Street
FLORIDA: Miami—423 N. E. 71st Street
Tampa—3313 W. Sevilla Circle
MISSOURI: St. Louis—7530 Forsyth Blvd.
Kansas City—1733 Main Street
TEXAS: Houston—1200 Jackson Street
VIRGINIA: Richmond—304 E. Main Street
GEORGIA, NORTH CAROLINA, SOUTH CAROLINA: Greenville, South Carolina—P. O. B. 3175

Request Catalog

LOVEJOY FLEXIBLE COUPLING CO.

4011 WEST LAKE ST. • CHICAGO 44, ILLINOIS

News (Continued)

Power Specialty—New Orleans

Power Specialty Company has announced the appointment of **Walter J. Verlander** as manager of its newly established New Orleans office. Mr. Verlander was recently associated with A. M. Lockett & Company, Ltd., of New Orleans where he had many years of experience in the application and sale of power plant, petroleum and petrochemical equipment.

Fitzgerald Gen. Manager of The Cameron & Barkley Co.

The promotion of **Edward J. Fitzgerald, Jr.**, from sales executive to general manager of **The Cameron & Barkley Co.** has been announced by Rufus C. Barkley, President.

Mr. Fitzgerald joined Cameron & Barkley in July, 1956 after five years with the Wix Corporation and their subsidiary, Carolina Metal Products, where he served as Assistant General Manager in charge of production and sales. His experience includes sales promotion, business management, engineering and production.

Attached directly to the executive staff, Mr. Fitzgerald will work with the individual branch managers and salesmen in Charleston, South Carolina; Savannah, Georgia; Jacksonville, Tampa, Orlando and Miami, Florida.

Jones & Laughlin—N.O.

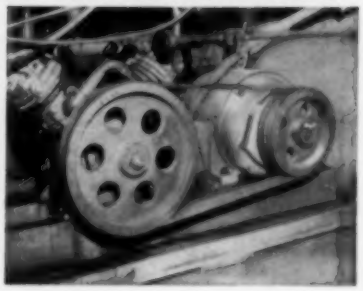
Thomas M. Hogan has been appointed Assistant District Sales Manager for **Jones & Laughlin Steel Corporation** in the **New Orleans** office, located in the Delta Building.

H. Drake Harkins Opens Florida Consulting Office

Following his recent retirement from the du Pont Company, Mr. H. Drake Williams has opened an engineering consulting office at 3037 Harbor Drive, Fort Lauderdale, Fla., with consultation in the following fields: industry-utility & steam-electric arrangements and cost reduction applied to new products.

TEAMWORK!

BROOK A. C. MOTORS AND YOUR COMPRESSORS



BROOK A. C. MOTORS provide a smooth flow of power to compressors regardless of climatic conditions. Brook Motors, 1 to 600 HP, cost less initially and assure maximum service life and overall economy. There is no finer motor built. They're powering air and gas compressors from Arabia to Wyoming, stacking up splendid performance records. There's a Brook Sales and Service Headquarters near you. Send for literature.

SINCE 1904

world's most respected motor

BROOK MOTOR CORPORATION

3553 W. PETERSON AVE., CHICAGO 45, ILL.

BROOK MOTOR CORPORATION

Keck & Assoc.—Atlanta

D. Richardson Ingman has been appointed an Associate and Chief Electrical Engineer of J. Wylly Keck, Jr. & Associates, Atlanta engineering firm.

Mr. Ingman, a 1951 graduate of Georgia Tech, was formerly associated with Lockwood Greene Engineers, Inc. of Spartanburg, South Carolina.

In his new position, Mr. Ingman will supervise all electrical engineering activities of the firm, both industrial and municipal.

McQuay Sales Manager

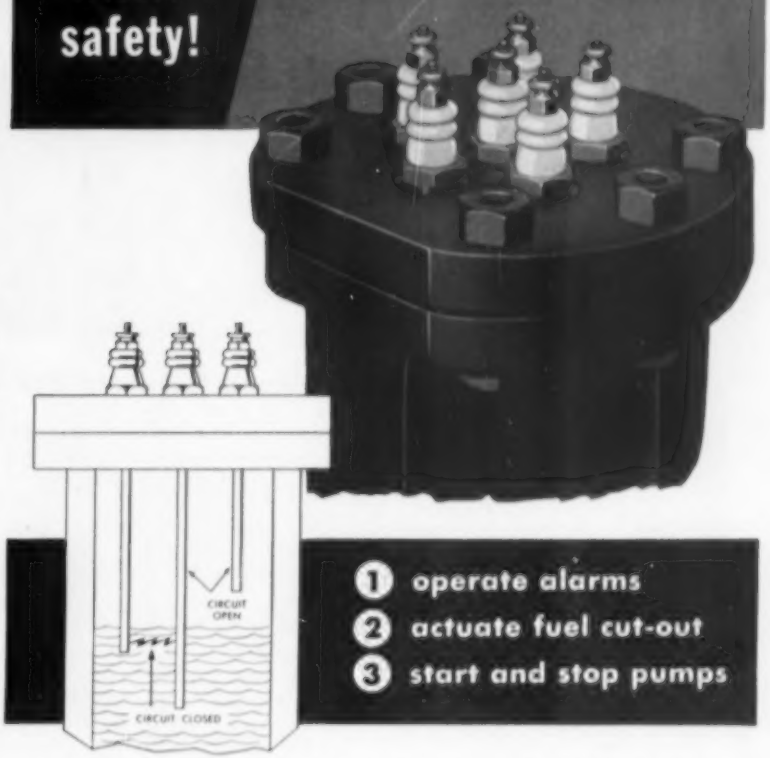
Kenneth R. Lundberg, general manager of the Grenada, Miss. plant of **McQuay, Inc.,** has been placed in charge of sales for the company.

He succeeds H. Blake Thomas, general sales manager, who has resigned. McQuay, Inc. manufactures heating, air conditioning and commercial refrigeration equipment. General offices are in Minneapolis, with factories in Faribault, Minn. and Grenada, Miss.

A member of the McQuay organization for 15 years, Lundberg has been chief engineer, manager of sales engineering and assistant general sales manager. He also was factory manager of the McQuay plant in Faribault.

Tiny currents guard boiler safety!

Reliance electrode-type Levalarms®



1 operate alarms
2 actuate fuel cut-out
3 start and stop pumps

For extra safety, guard your boiler water levels with audible and visible alarms that reach operators anywhere in the plant. Or cut fuel automatically, without depending on human action. Here's more protection for boilers working on any pressure to 2500 lbs.

Levalarms operate on isolated electric currents passing through the boiler water itself. When water level gets too high or too low, circuits are made or broken and actuate relays *instantly* to cause ACTION (1, 2, or 3 above).

Four models of Levalarms installed on or in your water columns, provide a selection for various control combinations. Levalarms have no bellows or stuffing boxes; no vacuum tubes or magnets. Action is positive, immediate. Levalarms are unaffected by pressure, temperature or water conditions.

Read the full story of Reliance electrode-type Levalarms in Bulletin D2 sent on request.

The Reliance Gauge Column Company • 5902 Carnegie Avenue • Cleveland 3, Ohio

The name that introduced safety water columns....in 1884

Reliance®

BOILER SAFETY DEVICES

DON'T GIVE UP!

—ON THAT TOUGH METAL-CUTTING PROBLEM!

USE

HKP

PORTER CUTTERS

JUST CAN'T BE BEATEN . . .

If it's a "hard-to-figure-how", metal-cutting job, — there is a PORTER CUTTER that can handle it for you, with amazing speed, and lowest possible cost. In the versatile PORTER line there are 108 different hand-powered cutters, each one designed to do a particular job, or jobs — to cut some type or size or shape of metal fast and cheap, including BOLTS, RODS, SCREWS, RIVETS, WIRE, CHAIN, SOFT, MEDIUM AND HARD METALS, STEEL STRAPPING, and many others. These rugged cutters exert up to 20,000 pounds cutting pressure — make hard work easy, cut labor costs as much as 97%! Want profitable proof? Write for the PORTER catalog.

Illustrated above — is the famous PORTER CENTER-CUT CUTTER. The leading all-round cutter for industrial production. 8 sizes — up to ¾" capacity.

for "PRODUCTION" CUTTING

The PORTER WORK-STATION CUTTER — in 3 sizes — can increase the output of one man up to 300% in continuous volume cutting, up to ½" capacity.

for THOSE RUGGED JOBS!

PORTER HEAVY DUTY CUTTER

Cuts almost anything in metal — up to ⅝" diameter — thanks to its heat-treated, heavy-forged straps, and hard-tempered, center-cut jaws. Available in 3 sizes.

WRITE FOR CATALOG

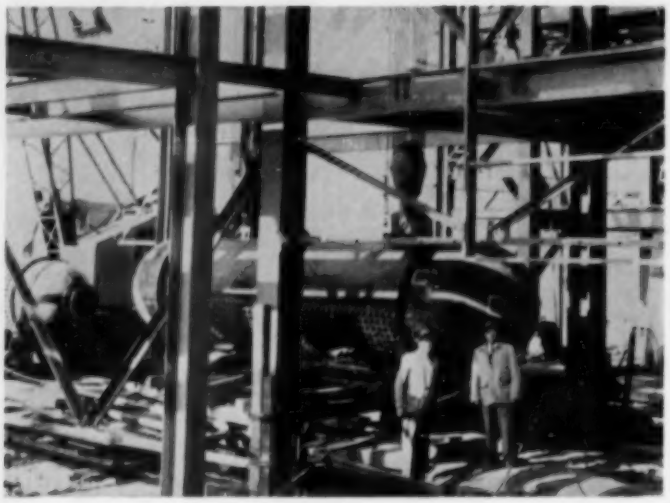
It should show you the way to the solution of your metal-cutting problem.

Contact your Industrial Distributor for Service

H. K. PORTER, Inc.

Somerville 43, Mass.

News for the South & Southwest (Continued)



Huge Recovery Boiler for Louisiana Plant

About to be raised into position is the highest pressure, highest temperature chemical recovery boiler ever built for the Kraft pulping process. Constructed by **The Babcock & Wilcox Company**, the 300-ton recovery unit is located at the **Southern Advance Bag Operation** of Continental Can Company's Robert Gair Div., in **Hodge, Louisiana.** At left is **Philip J. Hannan**, plant's pulp mill superintendent, and at the right is **Frank S. Ring**, plant manager.

Designed to operate at 1,250 lb pressure at the superheater outlet, with a final steam temperature of 900 F, the unit will generate 148,000 lb of steam and will be capable of processing liquor resulting from the production of 300 tons per day of Kraft pulp. Boiler will improve the over-all plant heat rate and increase the steam and power generated from the firing of recovered black liquor. The more efficient heat cycle will also be reflected in reduced power costs.

Conoflow—Carolinas

Brown & Morrison, manufacturers' representative with offices in Charlotte, N. C., has recently been appointed Carolinas sales representative for **Conoflow Corporation.**

Brown & Morrison has been a manufacturers' representative in the instrument and controls field for a number of years. Partners in the organization are: W. C. "Bill" Morrison, Harold K. Couch, and Donald H. Jones.

Mr. Morrison studied engineering at the University of North Carolina, and compiled an impressive background of engineering and sales experience with both manufacturers and representatives, before joining the late Mr. Brown as a partner in 1940. Mr. Couch received his engineering degree from Georgia Institute of Technology, and spent more than twelve years with the Babcock & Wilcox Company as a sales - applications engineer. He worked out of the company's Charlotte office, directly prior to his association with Brown & Morrison in 1954. Mr. Jones, also a graduate of Georgia Institute of Technology, was Sales Manager for the Milton Roy Co.

Albert C. Wood Assoc.

K. O. Miller has been elected vice president of **Albert C. Wood Associates Inc.**, Consulting Engineers of **Philadelphia, Pa.**

The Hawkins Company, Inc. Sales Reprs.—Carolinas

A new corporation—**The Hawkins Company, Inc.**, 201 Builders Bldg., Charlotte 1, N. C. — is a successor to The Hawkins-Hamilton Company, Inc., in the Carolinas. The new company represents Nash Engineering, Copes-Vulcan Div. of Blaw-Knox, Billmyre Blower Div. of The Lamson Corporation; Andale Co., Terry Steam Turbine Co., Peabody Engineering Co., and Crosby Valve & Gage Company.

William L. Hawkins directs the Charlotte office. In 1946 he joined the Hawkins-Hamilton Company, Inc., of Richmond, Va., and in 1951 opened the Carolina office. His father, H. B. Hawkins, president of The Hawkins-Hamilton Company, Inc., is a stockholder and chairman of the board of directors of this newly formed corporation.

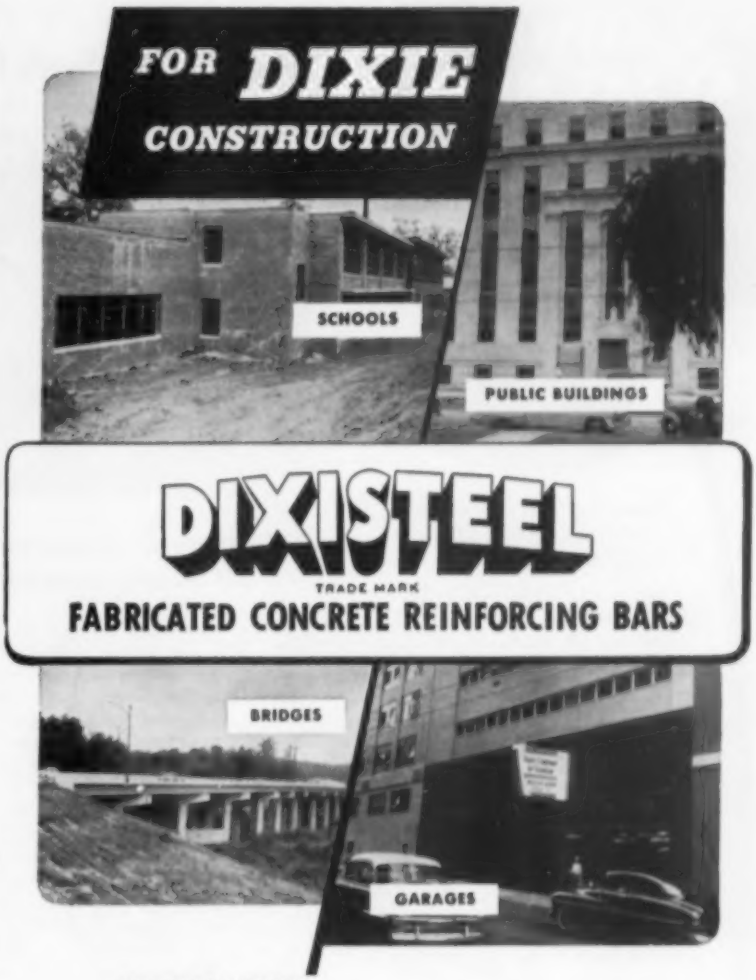
Associated with William Hawkins is **William W. Gotherman.** He joined the Elliott Company in 1947 and until 1951 was a field representative in the Carolinas. In 1951 he became associated with Purser and London, Inc., Charlotte, and now brings 10 years of application and engineering experience to the new company.

A. Lynn Thomas Company of Richmond—Refractory Award

For the 15th consecutive year, the **A. Lynn Thomas Company** of Richmond, Virginia, has received the bronze plaque award of merit given by the A. P. Green Fire Brick Company of Mexico, Missouri for "Outstanding Service in the Distribution and Engineering of A. P. Green Refractory Specialties."

Wilton L. Thomas, president and general manager, recently received the award from O. H. Read, regional sales manager of the A. P. Green Fire Brick Company. **Richard G. Lewis** is vice president of sales engineering for the A. Lynn Thomas Co., **Arthur D. Thomas** is vice president of installation services, and **Bosman H. Francis** is superintendent of field installational crews.

The company is one of the largest distributors of refractories in the South Atlantic States with offices and warehouses in Richmond, Norfolk, Raleigh, Charlotte and Columbia. In addition to the A. P. Green line, they are authorized distributors for Norton "special heavy duty refractories" and E. J. Laving "chrome refractories."



FABRICATION THAT BUILDS SATISFACTION

The entire construction trade—from contractor to the man who places the bars — has found it profitable to specify and use DIXISTEEL Concrete Reinforcing Bars . . . fabricated at the mill to exact specifications.

Basic bars are hot-rolled from high-quality steel. They are fabricated with the utmost precision, to save valuable time on the job.

Call us in on your next job and see why it pays to do business with DIXISTEEL.

- QUICK, ACCURATE ESTIMATES
- COMPETENT ENGINEERING AID— DETAILING AND BILLS OF MATERIAL
- RAPID, DEPENDABLE SERVICE
- COMPLETE, ADEQUATE STOCKS

Also headquarters for welded wire mesh and bar supports.

FABRICATING DIVISION
Atlantic Steel Company

PO Box 1714, ATLANTA 1, GEORGIA — TRinity 5-3441

V-BELTING BY THE MILE!

Fasteners by ALLIGATOR

✓ Open-End V-Belting (in rolls) is now supplied by all major V-Belt manufacturers.

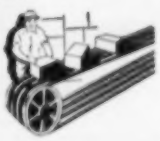
✓ Improved **ALLIGATOR V-BELT FASTENERS** are recommended by all manufacturers of Open-End V-Belting (in rolls).

Need a 23'—3½" Long V-Belt?

. . . or one a mile long? Alligator Fastened V-Belts can be made up any length to fit any drive.

Convey with V-Belts?

With Alligator Fastened V-Belts you can make up conveyors any width, any length.



Got a shaft you want to go around?

Alligator Fastened V-Belts will do it. No need to dismantle anything.

Fixed centers—no means of take-up

Alligator Fasteners solve this problem!

The above represent but a few of "V-Belt Applications *Unlimited*" — do they give you any ideas?

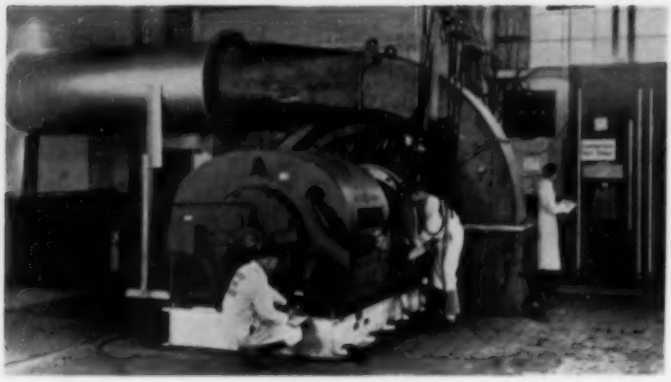
Write for information.

Ask for Bulletin V-219

FLEXIBLE STEEL LACING CO.
4625 Lexington St. Chicago 44, Ill.

ALLIGATOR V-BELT FASTENERS

News for the South & Southwest (Continued)



Centrifugal Compressor Design Meets Higher Air Supply Requirements for Florida Plant

An indication of a trend in power plant operation toward higher duty and air supply requirements is found in a large capacity centrifugal compressor delivered by **American Blower Corporation.** This compressor is the third of a four-unit group to be used in furnishing air for a cyclone fired boiler in a new power station designed by **Stone & Webster Engineering Corp.,** and owned and operated by **Tampa Electric Co.,** Tampa, Florida.

Compressors incorporate 48-in. intake and discharge connections designed with unobstructed diffuser passages for high efficiency operation. They are of welded heavy-gauge steel construction. Each is driven by a weather protected 1000 hp, 1800 rpm squirrel cage induction motor. The 48-in. unit is rated for delivery of 325,000 lb of air per hour (corresponding to 78,200 cu ft per min) at 65.5-in. w. g. static pressure. Total capacity of the group of four compressors is 1,300,000 lb of air per hour.

Harper Co.—Southeast

The H. M. Harper Company of Morton Grove, Illinois, makers of corrosion-resistant fastenings since 1923, has announced the appointment of **William O'Dell** as district manager of the company's operations in the Southeast. Branch offices are at 3131 Maple Drive, N.E., Atlanta 5, Georgia.

Robertshaw-Fulton—South

Appointment of **A. W. Roat** as applications engineer, controls sales section, of the **Fulton Sylphon Division of Robertshaw-Fulton Controls Company,** has been announced. Mr. Roat formerly served on the sales staff of the Company's Fielden Instrument Division. His office will be at the Fulton Sylphon Division, Knoxville, Tennessee.

Quaker Rubber — Atlanta

Charles E. Tate is now **Atlanta, Ga.** District Sales Manager for **Quaker Rubber Division, H. K. Porter Company, Inc.** He joined Quaker in 1949. For the last seven years he has been Quaker Sales Representative in Virginia.

Atlanta Distr. Sales Office for B&W Tubular Products

The **Babcock & Wilcox Company's** Tubular Products Division has opened a new district sales office at 830 W. Peachtree St., N.W., Atlanta 8, Georgia. **William Lehr,** formerly district salesman for the company's Cincinnati office, is the new Atlanta manager. Office serves Georgia, South and North Carolina, Alabama, Florida and the southeastern section of Tennessee.

Republic Rubber—South

James D. Evans has been named a field representative for the **Republic Rubber Division**, Lee Rubber & Tire Corporation.

Evans will headquarter in New Orleans, La., where he will be responsible for the sales and service of Republic's line of belting, hose, packing, and molded and extruded products in **Mississippi**, **Louisiana**, and part of **Alabama**.

Lincoln Electric — Charlotte

The Lincoln Electric Company has announced that **Richard M. Stratton** is now District Manager of the **Charlotte, North Carolina** area. Prior to his new assignment, he was a welding engineer for The Lincoln Electric Company in Baltimore and, earlier, Washington.

DeLuxe Saw & Tool—Ky.

DeLuxe Saw and Tool Company has opened a second plant for manufacturing carbide tipped saw blades and cutting tools in **Louisville, Kentucky**, where the DeLuxe sales and accounting offices are now located. The other DeLuxe factory at High Point, N. C., will continue to operate in the same capacity as in the past. New blade production and complete factory repair service will be available at both the Louisville and High Point plants.

A. G. Feldmann, Vice President, Engineering, of DeLuxe, is moving his office from the High Point plant to Louisville, where a new Products Development and Research Engineering Department is being established. This department will develop new and more efficient uses of carbide tipped cutting tools for woodworking and non-ferrous metals, and expand the line of Karbide King cutting tools.

Yale & Towne—Southwest

Roger R. Reynolds has been named hoisting equipment district sales manager in Texas, Oklahoma and Louisiana for the **Yale & Towne Manufacturing Co.** A second district office has been opened in **New Orleans** with **L. Patrick McGauley** in charge.

Baker—Tenn.

New dealers in Chattanooga, Nashville, and Knoxville Tennessee, have been announced by **Baker-Raulang Company.** The three will handle Baker's complete line of gas and electric fork lift, platform, and crane trucks, and the unique Traveloader side-loading fork truck.

Ortmeier Machinery Company is the new **Chattanooga** dealer, located at 1308 E. 23rd Street. In **Nashville** the new dealer is **Peffen Machine Company**, 316 Sixth Avenue South. The new **Knoxville** dealer is **Dempster Machine Company**, 1649 Riverside.

Florida Power Corporation

J. K. Flanagan is now vice president in charge of public relations for **Florida Power Corporation**, according to **W. J. Clapp**, company president.

Mr. Flanagan, who will head up an expanded public relations program, has served as director of advertising and publicity for the past 15 years.

COMBUSTION with SAFETY

Unparalled safety is but one of the features of WEBSTER'S revolutionary non-premixing ring gas burner incorporating flame retention regardless of air velocity.

Factory assembled Forced Draft Series H packaged units are available for Gas, Rotary Oil or Combination. Other variations soon to be available.

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STEAM TURBINES . . . FURNACES BOILERS, STOKERS, BURNERS

2—Water Tube Boilers — Shop-assembled "package" gas-oil or combination fired units described in 8 page brochure. Pressures to 600 psig; 1,000 to 20,000 lb/hr — design features, installations. — VULCAN STEEL TANK CORP.

3—Boiler Seam Protector — Catalogue sheet describes and illustrates why H.R.T. boilers need refractory seam protection. — NATIONAL BOILER PROTECTOR CO.

9—Free Coal Counseling — General information on how Coal Bureau engineers will advise on selection, transportation and utilization of the right coal for your purpose.—NORFOLK AND WESTERN RAILWAY.

11—Feedwater Treatment — Bulletin describes liquid and dry (Braxon & Flako) boiler feedwater treatment recommended for removal and prevention of scaling and corrosion during use of many types of water and for prevention of foaming and carryover. — ANDERSON CHEMICAL CO.

14—Generator Installations — Bulletin GB-1 shows how installations of Amesteam Generators have solved boiler room problems for their owners. Photos illustrate units from 10 through 600 hp for firing combinations of oils and gases. — AMES IRON WORKS, INC.

44—Fan Stacks — I-D fan, breeching and stack integrated in a single unit described in Bulletin 1-PCD-1. Straight through breeching assures high, predeterminable efficiency. Structural steel requirements reduced and installation simplified.—PRAT-DANIEL CORPORATION.

48—Boiler Tubes — Booklet gives information on care of boiler tubes, causes of chemical attack, etc. Contains charts of weights, working pressures, etc., for boiler tubes and pipe. — BOILER TUBE COMPANY OF AMERICA.

51—Packaged Water Tube Boilers — Complete data and dimensions for boilers ranging from 8,000 to 50,000 lb/hr, firing oil or gas or both, described in 12 p Catalog 111-D.—SUPERIOR COMBUSTION INDUSTRIES, INC.

56—Water Tube Boilers — Booklet — Describes details of stoker — oil or gas or combination gas/oil, 10 to 350 hp to 250 psi; designed for easy conversion to any fuel. — QUEEN CITY ENGINEERING CO.

60—Packaged Generator — Bulletin PG-55-3 outlines features of new generator line in capacities from 10,000 to 46,000 lb/hr. Shipped completely assembled — all ready for fuel, steam and electrical connections.—FOSTER WHEELER.

62—Stokers for Refuse or Coal — Catalog 505, 24 pages—Describes and illustrates the Roto Stoker, stationary grate and dumping grate type, both manual and power, for the burning of refuse or coal, or a combination of the two—typical application photographs and engineering data.—DETROIT STOKER CO.

68—Oil Burners — Bulletin 65 — Describes National Airoil Type "LAP" oil burners to operate with light or heavy oil under manual or automatic control, using low air pressure for atomization. Wide firing range in each of seven sizes. — NATIONAL AIROIL BURNER CO.

76—Gas Burner — Bulletin — Describes the Rectilinear gas burner, an application of the venturi principle which provides high input through narrow rectangular openings for firing — in a horizontal plane through fire doors or small openings over handfired coal grates or stokers — or for firing in a vertical plane on either side of stoker or oil burner.—THE WEBSTER ENGINEERING COMPANY.

80—Hot Water Boilers — 20 page brochure describes and illustrates the design, construction, advantages and economies of the La Mont controlled circulation hot water boiler for supplying high pressure, high temperature water for heating systems and process applications. — COMBUSTION ENGINEERING, INC.

83—Steam & Hot Water Generators — Booklet describes company's line of fifteen compact models from 18 to 500 hp (15 to 200 psi). Only five connections needed; no special foundation. — CYCLOTHERN DIVISION, NATIONAL-U. S. RADIATOR CORP.

87—Steam Turbines—Single Stage—Bulletin 500 describes features and characteristics of company's type DH steam turbines in horizontal and vertical models. — DEAN HILL PUMP COMPANY, INC.

FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

104—Fans—Bulletin F-102 & F-200 describes Type "BL" and "BLH fans offering high stability and efficiency for all classes of ventilation. Type "BLH" designed for high, broad efficiency curve on higher pressure jobs (6¾" water gauge and up). — BUFFALO FORGE COMPANY.

108—Active Air—Catalog 2046 shows how to put active air to work in buildings and shops. Direct drive exhaust fans, air circulators, and ceiling fans. — EMERSON-ELECTRIC.

112—"Packaged" Fans — Catalog 515 shows how Clarage V-belt Ready Units economically answer your smaller air handling requirements. 18 sizes, wheel diameters 9¾ to 32½", capacities to 12,000 cfm. Direct connected units also available. —CLARAGE FAN CO.

116—Air & Gas Compressors—Form 3132-A shows complete range of centrifugal and reciprocating units used in process and chemical industries — for all pressures from deep vacuum up to 35,000 psi and capacities up to 165,000 cfm. — INGERSOLL-RAND COMPANY.

148—Hydraulic Pump-Motor — Bulletin 22 describes low-speed and high-torque units for industrial service. Can be direct-connected without speed reducers, thus conserving space. — GEO. D. ROPER CORP.

152—Stainless Steel Pump — Bulletin 725.4 describes pump for economical handling of hot, corrosive or abrasive liquids; 9 sizes with capacities up to 720 gpm; heads to 200 ft. — GOULDS PUMPS INC.

Note Your New Reader SERVICE on Advertisements

162—Condensate Return Pumps — Catalog No. H-1 includes photos, dimension drawing, selection tables, and operating data on "NCR" Single and "NCRD" duplex condensate return pumps, especially designed for low pressure steam heating systems and which handle condensate up to 200 F.—C. H. WHEELER MFG. CO., ECONOMY PUMP DIV.

170—Heat Exchangers — Bulletins 120 & 124 describe Aero units which cool liquids & gases by evaporative cooling with atmospheric air, removing heat at rate of input, and precisely controlling temperature. Solves problems of water availability, quality or temperature. — NIAGARA BLOWER CO.

INSTRUMENTS—METERS CONTROLS—REGULATORS

201—Flowmatic Boiler Feed Control —Bulletin 1003, 12 pages—Gives applicational photos and detailed schematic drawings and charts. Relay and direct operation are covered. Case studies of representative boiler loads indicate stability of Flomatics in controlling feedwater automatically according to steam flow. — COPES - VULCAN DIVISION, BLAW-KNOX COMPANY.

202—General Purpose Controls—32 p operation and application manual GEA-6372 explains what each product is, shows how product works and tells where devices can be applied. Covers manual, magnetic and reduced-voltage starter; push buttons; relays; limit switches; solenoids; pressure and vacuum, float and plugging & anti-plugging switches.—GENERAL ELECTRIC COMPANY.

205—Draft Gages — Bulletins describe inclined, vertical tube, air filter gages, straight line and dial pointer type, minified draft and receiver type gages, velocity gages and pitot tubes, gas analyzers and steam calorimeters. — ELLISON DRAFT GAGE CO.

212—Automatic Temperature Control —Data sheets describe versatile automatic indicating temperature control offering many sequence combinations—step-heating, heating and cooling, wide limit control, or temperature control plus operation of signal devices.—SARCO COMPANY, INC.

224 — Precision Relays — Bulletin MRM 240 describes new high limit and low limit action relays for alarm signalling and on-off operation of electrical loads. — MANNING, MAXWELL & MOORE, INC.

235—Liquid Levels — Bulletin 532 describes indicator which gives a reliable, automatic reading of storage tank contents. 20" dial in 3 x 10" case saves panel space. No outside power source needed; can be located up to 250 ft from tank. —THE LIQUIDOMETER CORP.

255—Annunicator Systems — Catalog 100B describes Panalarm annunicator system; includes use, data on operating sequences, enclosures, mechanical specifications, remote equipment and components, and performance features. — PANALARM DIV., PANELLIT, INC.

268—Water Reducing Valve — Bulletin 553 describes how 50% greater capacity regulation is gained with Hi-Flo water pressure valve. Includes complete sizing data. — LESLIE CO.

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274 — Self-Operated Regulators — Series 655 regulators used on a wide variety of industrial applications to control the pressures of water, steam, oil, gas or other fluids, are described in 4 p Bulletin C-655. Also used as an air operated shut-off valves, which are actuated by pneumatic switches, so solenoid valves, pilot valves or remote panel loaders. — FISHER GOVERNOR COMPANY.

297—Remote Signal Alarms—Bulletin WG-1824 describes how lights on horns, operated by indicator control unit give instant warning of any serious deviation from normal boiler water level. — YARNALL-WARING COMPANY.

PLANT EQUIPMENT—WELDING TOOLS—PROCESS SPECIALTIES

300—Cast Iron Welding—Data sheets describe the new Xyron 2-25 strontium-aluminum bearing electrode for crack-free welding of gray and ductile cast iron, including Meehanite, Ni-Resist, and for joining cast iron to steel. — EUTECTIC WELDING ALLOYS CORP.

307—Condensate Drainage Control—Publication 6025 describes units for improving quality of heat transfer in process equipment through continuous return of condensate to boiler at high temperature and pressure. Lists many cases substantiating claim for increased heat transfer, more production with less fuel. — COCHRANE CORPORATION.

315—Pressure Vessels—Catalog 100 discusses your plate fabrication problems and shows how company custom-fabricates hot water storage heaters, tanks, air receivers, blow-off tanks, etc. Corrosion resistant linings and materials featured. Suggested specifications and other valuable technical data given. — J. J. FINNIGAN CO.

318 — Wrought Iron — "ABC's of Wrought Iron"—A concise digest of more detailed technical handbook material on wrought iron—describes resistance to corrosion, fabrication process—where needed—shock and vibration endurance.—A. M. BYERS.

336—Retaining Walls—Catalog RW 3555 shows how bin-type walls stabilize slopes and gain valuable ground for buildings, parking areas; all-metal cellular construction; all-bolted assembly means small crews can do the job.—ARMCO DRAINAGE & METAL PRODUCTS, INC.

339—Aluminum Grating — Catalog shows types available, a safe load table, stair treads available in abrasive and serrated nosing. Grating especially designed for safe footing in industries where grating is subject to excessive dampness, oil or grease. Both riveted and pressure-locked designs available.—KERRIGAN IRON WORKS, INC.

350—Industrial Space Heaters—Bulletin GC 4-55 describes complete line of oil or gas fired Thermobloc industrial heaters for any size job. Completely self-contained, fully automatic. — THERMOBLOC DIV., PRAT-DANIEL CORP.

351—Steel Grating & Treads—Bulletin 2486 describes electroforged steel grating and treads, their advantages and typical successful applications.—BLAW-KNOX EQUIPMENT DIVISION, BLAW-KNOX COMPANY.

363—Magnetic Separators—Catalog 910 covers wet concentration and magnetic recovery. Various types and sizes shown as well as typical installations and machines. — JEFFREY MFG. CO.

367—Industrial Track—How you can save with relaying rails outlined in Catalogs RT-9. Covers switch material and accessories. — L. B. FOSTER CO.

371 — Storage Racks — Brochure shows how Tube-Strut saves you money. Single coupling is used with common pipe or tubing; 100% adjustable and re-usable; no threading or welding.—TUBE-STRUT DIVISION.

376—Safety Grating & Treads—Bul. R-655 describes Relgrit, a non-

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absorbent tough abrasive baked into V-shaped openings along top edges. Non-skid even when wet, muddy or oil soaked. — RELIANCE STEEL PRODUCTS CO.

387—Chemical Feeders — Bulletin 50TS—Describes Series 5D feeders for use on boiler feedwater pumps and in similar applications. Several models and types of drive are shown.—MANZEL DIVISION.

PIPING, VALVES, FITTINGS STEAM SPECIALTIES, TRAPS

402—Forged Steel Valves—32 page supplement of Catalog F-9 covers new general purpose gate, globe and angle valves for 150-800 lb service. Featuring hard faced seating surfaces. — HENRY VOGT MACHINE CO.

403—Valve Operators—Folder shows how re-designed sprocket rim makes any valve readily accessible from the floor. Simplifies pipe layouts, prevents accidents, fits all valve wheels. — BABBITT STEAM SPECIALTY CO.

409—Lubricated Plug Valves—Catalog PV-4 covers operational features. Quarter-turn to open or close; lubricant grooves provide positive seal when valve is closed; when open, seating surfaces not exposed. —THE WM. POWELL COMPANY.

410 — Piping Insulation Manual — "Technical Data Manual," 20 p booklet, gives engineers all available information on the application of Gilsulate, a new insulation for underground hot pipes. Describes three grades, how to determine ditch size for various pipes and types of soil, and gives sample problems. — AMERICAN GILSONITE COMPANY.

413—Reducing Valve—Bulletin 553 gives graphic performance comparison and capacity data of the new "Hi-Flo" valve for water reducing stations, fuel oil pressure control, process lines, etc.—LESLIE CO.

419 — Small Gate Valve — Multiple applications of small forged steel gate valve noted in Catalog 10. Low maintenance. Sizes from ¼" to 2"; rising stem with yoke or rising stem with inside screw; Pressures from 380 psi at 1000 F to 2000 psi at 100 F.—THE CHAPMAN VALVE MFG. COMPANY.

426—Pressure Regulating Valves — Standard line of regulating valves for steam, water and air service described in Cat. 77. Complete specification data. — MASON-NEILAN DIV.

432—Aluminum Jacketing — Data sheets describe low first-cost, long life jacketing for weatherproofing of insulated lines, towers, vessels and tanks. Lap-Seal design feature makes more positive weather seal. — CHILDERS MANUFACTURING COMPANY.

443—PVC Fittings & Flanges—Corrosion resistant polyvinyl chloride pipe fittings & flanges covered in 12 p catalog, featuring characteristics, advantages, limitations, operating pressures, temperatures, field tests, etc.—GRINNELL COMPANY, INC.

445—Heat Transfer Medium — How new solid medium can give you savings up to 75% over jacketed equipment outlined in brochure. Non-metallic plastic compound easily applied in paste form over either steam traced or thermal electric systems; wide temperature range. — THERMON MFG. CO.

475—Chrome Alloy Pipe & Tubing — No. 620 stock list tabulates available low chrome alloy pipe and tubing for high temperature use. — MIDCONTINENT TUBE SERVICE, INC.

490—PVC Valves and Fittings—Circular 601, 4 pages—Illustrated circular describes "Luncor" all-molded polyvinyl chloride valves and fittings, which have remarkable resistance to corrosive chemical action; lists types of corrosive service for which they are recommended. —THE LUNKENHEIMER CO.

491—Control Valves—Catalog 1500-B, illustrated — Describes complete line of Domotor, solenoid-operated and handwheel single seat control valves for handling difficult fluids under extremes of temperature and pressure. Offers full, unrestricted flow, positive plug and seat alignment and directional flow flexibility. — THE ANNIN COMPANY.

MAINTENANCE PACKING GASKETS, LUBRICATION

500—Liquid Separator Filter—Catalog describes Fram Space-Saver Units, for removing water from liquid hydrocarbons by filtration. Units engineered for easy installation and maintenance and are designed for a wide variety of applications—up to 69 gpm. — WARNER LEWIS COMPANY.

504—Bearing Stock—Catalog No. 52 describes cast bronze bearing, bars and special parts. Gives engineering data. — THE BUNTING BRASS & BRONZE COMPANY.

505—Metal Cutters — Bulletin 655 shows actual cost figures on various metal cutting jobs (bolt, rod, wire, chain, etc.) by using cutters, hand- and power-operated cutters.—H. K. PORTER INC.

513—Conveyor Belt Repairs — Bulletin R-700 and Folder R-4 describe the "Rema" method of making vulcanized repairs without heat. Holes, gouges, rips and tears can be repaired on the job. Curing time delay is eliminated. Belts can be put into service immediately after repair is made.—FLEXIBLE STEEL LACING COMPANY.

514—Hot Spray Heaters — Bulletin SPI-32 gives questions & answers on "Why Hot Spray Protective Coatings." Gives you lower painting costs—viscosity control, greater coverage, better quality, time and material savings, longer film life and all-weather spraying.—SPEE-FLO.

570—Multi-Purpose Grease — Bulletins describe new single product Gulfcrown grease (4 consistencies) that does the work of many—simplifies application and avoids errors, reduces inventory & cuts lubrication costs; grease gun or centralized system application.—GULF OIL CORPORATION.

594—Corrosion Control—Booklet, 20 pages — "Corrosion Control of Electric Light and Power Structures and Equipment" is designed to give company field operating men practical painting information on all phases of transmission and distribution work. Applicational photographs.—SUBOX, INC.

595—Plant Lubrication — The Lubriplate Service Handbook — Gives valuable information on the subject of lubrication in all its forms, intended to be of everyday use to plant superintendents, managers, maintenance engineers and those in charge of plant production and maintenance. — LUBRIPLATE DIVISION, FISKE BROTHERS REFINING CO.

596—Tube Cleaners & Expanders — Catalog 77 covers tubes in high pressure boilers, superheaters, economizers and other heat exchange equipment. Model 38 expander rolls and flares in single operation. — THOMAS C. WILSON, INC.

598—Valve-in-Line Reseaters — Bulletins describe power-driven, one-man operated reseaters (pneumatically or electrically powered) for modern gate and globe valves. Reduces grinding time to minutes. Saves money on valve inventory and maintenance.—THE LEAVITT MACHINE COMPANY.

ENGINES, DRIVES POWER TRANSMISSION MATERIALS HANDLING

600 — Conveyor Idlers — Bulletin SI-116 describes pre-lubricated "UST" Conveyor Idlers. Incorporating Timken bearings and Garlock Klozures, construction permits operating without lubrication for 1-3 years or more. — CONTINENTAL GIN COMPANY.

629—Longer V-Belt Life—12 page Bulletin 20X6234C describes various types of V-belts and tells how to select and match them. Lists seven steps for correct installation and hints for making them last longer.—ALLIS-CHALMERS MFG. CO.

630—Mechanical Vibrating Conveyors—Catalog 890 gives information on conveyability and density of typical solid materials and provides data on how to "Do It Yourself" to get required length.—JEFFREY MFG. CO.

648—Belt Fastening Tools — Bulletins F-110 and F-111—Describe new Flexco power tool wrenches and power tool boring punches, designed to speed up fastening of wide conveyor belts; and give recommendations on the use of various impact tools connected therewith.—FLEXIBLE STEEL LACING CO.

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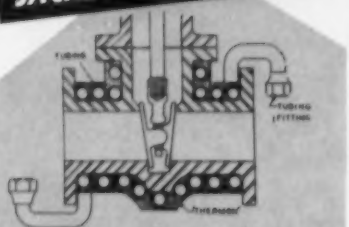

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Thermon, the product, and Thermonizing, the process, represent a revolutionary new concept in the science of external heat application. Thermon is a non-metallic plastic compound with highly efficient heat transfer properties, and is easily applied in a viscous paste form over either steam traced or thermal electric systems. It completely surrounds the tracer tubing and conducts heat to the entire surface to be heated.

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1. LOW COST—save up to 75% over equal jacketed equipment.
2. EXCELLENT HEAT TRANSFER —Exceeds steam traced equipment approximately 1100% and very closely approaches jacketed equipment.
3. DEPENDABILITY—no hot or cold spots.
4. WIDE TEMPERATURE RANGE —used for sub-zero cooling or heating to 750°F.
5. NO JACKET PLUGGAGES OR PRODUCT CONTAMINATION —in case of equipment failure, Thermon separates product from heating medium.
6. GOOD MECHANICAL AND THERMAL SHOCK RESISTANCE —cracking, spalling, and degradation are all nil—less than 1% linear shrinkage.
7. ADAPTABLE—may be used with either steam traced or thermal electric equipment—installed at our shops or your job location.
8. RAPID DELIVERY—use of standard equipment permits minimum delivery time.

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696—Belt Manlifts—Catalog 5A-156 describes 3 sizes of belt-type manlifts for simultaneous traffic in both directions for plant personnel. Comply with A.S.S. Code requirements. — J. B. EHRSAM & SONS MFG. CO.

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725—Cooling Tower — Bulletin CT-56-1 gives construction and operational details of new induced draft cooling tower. — FOSTER WHEELER CORPORATION.

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803—Shielded Electrification—Bulletin KS-1 describes "Kant Shock" for monorail and crane systems. Shielding prevents accidental contact with live bus bars. Eliminates all hazards of open bar conductors, prevents costly accidents, protects employees and reduces insurance rates. — AMERICAN MONORAIL CO.

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869—Heaters & Devices — 72 page Bulletin BEC-1005H includes information on redesigned cartridge heaters, miniature soldering irons, aluminized steel sheath strip heaters, and new ratings and configurations of finned tubular heaters. Describes ceramic-to-metal and plastic resin hermetic seals. Also contains power requirements section. — GENERAL ELECTRIC CO.

879—Commutator Maintenance — 27 page booklet B-6150-A contains information on brush and commutator maintenance. Includes maintenance requirements, factors affecting commutation and carbon brush materials. — WESTINGHOUSE ELECTRIC CORP.

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Q-1—Motor Operated Cranes—Data sheets give scheduled program of preventive maintenance which will help to avoid excessive wear, accidents and lost time.—AMERICAN MONORAIL CO., 13107 Athens Ave., Cleveland 7, Ohio.

Q-2—Bearing Metal—Bulletin 80-5 describes 5 types of bearing metals made by the Glyco process, which is said to be superior to tin alloys, cost less and last longer. Lists different hardness ranges and applications for which each type is best suited.—JOSEPH T. RYERSON & SON, INC., Box 300, Cincinnati 14, Ohio.

Q-3—Gripper Sling—18 page catalog illustrates and describes Gripper Woven Wire Slings. Typical applications and price information included. — CAMBRIDGE WIRE CLOTH CO., Cambridge, Md.

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Q-4 — Portable Hoists — 12 page Booklet No. 3-97C describes and gives specifications for Joy Single Drum Multi - Purpose Portable Hoists. — JOY MFG. CO., Oliver Bldg., Pittsburgh 22, Pa.

Q-5—Condenser Tube Safeguard — Bulletin 19B8590 gives examples of how the clip-on condenser tube protectors have eliminated the erosion effect on tubes. Carries sketch of typical erosion pattern on steam side of condenser and includes design details of the patented protector. — ALLIS-CHALMERS MFG. CO., Milwaukee 1, Wis.

Q-6—Grinder Tools—8 page illustrated bulletin describes features and advantages of company's grinder line. — WALKER-TURNER DIV., ROCKWELL MFG. CO., 400 No. Lexington Ave., Pittsburgh, Pa.

Q-7—Alloy & Flux Buyers Guide—6 page reference folder offers considerable data needed by buyers of specialty alloys and fluxes to help them make the wisest choices for their particular applications.—ALL-STATE WELDING ALLOYS CO., INC., 249-55 Ferris Ave., White Plains, N. Y.

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Q-9—Maintenance Products—6 page catalog describes company's complete line of industrial maintenance products—paints, protective coatings, etc. — THE SKYBRYTE CO., 3125 Perkins Ave., Cleveland 14, Ohio.

Q-10—Electric Heating Units—Catalog 50 lists the full Chromalox line of industrial process electric heaters. Well illustrated, giving prices and standard ratings. — EDWIN L. WIEGAND CO., 7500 Thomas Blvd., Pittsburgh 8, Pa.

Q-11 — Fire-Resistant Compressor Fluid — Technical Bulletin No. 0-133 contains information on Pydraul AC, a fire and explosion resistant fluid. Also gives instructions for conversion of compressors to its use. — MONSANTO CHEMICAL CO., ORGANIC CHEMICALS DIV., 800 No. Twelfth Blvd., St. Louis 1, Mo.

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Q-14—Oil Testing Kit—4 page bulletin describes the Simplex Oil Testing Kit which enables non-technical personnel to make quick determinations of the amount of harmful contaminants in used engine oils. Includes testing procedures.—GARDNER LABORATORY INC., Box 5728, Bethesda 14, Md.

Q-15—Brush & Commutator Maintenance—Booklet B-6150-A contains information on maintenance requirements, factors affecting commutation, and carbon brush materials. — WESTINGHOUSE ELECTRIC CORP., Box 2278, Pittsburgh 30, Pa.

Q-16—Weldless Repairs — Bulletin No. 14 describes method of making weldless repairs to iron, steel, other metals and plastics. — SMOOTH-ON MFG. CO., 572 Communipaw Ave., Jersey City 4, N. J.

Q-17—Corrosion Proofing — Pamphlet describes some recently developed products for corrosion-proof masonry construction and protective coatings and linings for surface application. — PENNSYLVANIA SALT MFG. CO., Three Penn Center Plaza, Philadelphia 2, Pa.

Q-18—Maintenance Paints — Folder outlines solutions to rust, wetness, fungus, odor-free painting, non-toxicity, freezing temperatures, chemical fumes and slippery floors. —THE WILBUR & WILLIAMS CO., 130 Lincoln St., Boston 35, Mass.

Q-19—Glass Protected Smokestacks —Bulletin SS-202 discusses glass protected steel smokestacks, which are said to offer 3 to 5 times longer protection against flue gas condensates and weathering.—A. O. SMITH CORP., Milwaukee 1, Wis.

Q-20—Hose Clamps, Tools & Fittings —Catalog 300 describes standard type hose clamps, grooved hose fittings, and special tools and replacement parts. 12 page booklet is also an instruction and training manual.—PUNCH-LOK CO., 321 No. Justine St., Chicago 7, Ill.

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Special Chromalox features solve 3 spot heating problems

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Spring strain reliever of high temperature stainless steel for applications in which cartridge heater leads flex. High tensile spring, mechanically locked to heater, covers lead wires a distance sufficient to distribute stress.

MOISTURE

Moisture-resistant flexible brass conduit protects lead wires of cartridge heaters operating in presence of steam, water, oil and vapors. Also offers added protection from flexing, vibration and mechanical damage.

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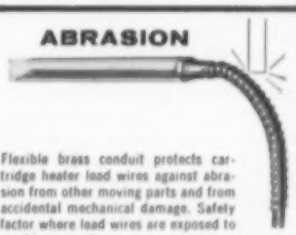

Flexible brass conduit protects cartridge heater lead wires against abrasion from other moving parts and from accidental mechanical damage. Safety factor where lead wires are exposed to machine operator.

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Q-22 — Switchgear Maintenance — 8 page publication GER-1282 outlines a product maintenance program for medium voltage, metal-clad type switchgear and air-magnetic and oil-filled types of power circuit breakers. Includes photographs and trouble-shooting chart. — GENERAL ELECTRIC CO., Schenectady 5, N. Y.

Q-23—Cathodic Protection—Booklet "Fighting Corrosion with Corrosion" discusses cathodic protection to metals.—ELECTRO RUST-PROOFING CORP., Belleville, N. J.

Q-24—Roof Coating—4 page bulletin describes Careyclad, the roof coating with twice the life. Gives tips on roof maintenance. — THE PHILIP CAREY MFG. CO., Lockland, Cincinnati 15, Ohio.

Q-25—Pipe Marking Materials — 8 page catalog "How to Select the Best Self-adhesive Pipe Marking Materials" lists over 500 Vinyl plastic pipe markers which conform to accepted standards. — PRINTED CELLOPHANE TAPE CO., 521 North La Brea, Los Angeles 36, Calif.

Q-26—Safety Turn Bar — Bulletin describes "Super-R-Guy" Safety Turn Bar for use in place of dangerous homemade pinch bars for turning steel plates and shapes. — GUIBERT STEEL CO., Box 4342, Pittsburgh 4, Pa.

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Maintenance Requirements

(*Starts on Page* 43)

more and more important to operate the plant with minimum outage and high quality production.

The maintenance head today must concern himself with the total mill cost of the product. It is not as important to know whether the maintenance cost is going up or down as it is to know that *mill cost* is being lowered and high quality production maintained. Only in this way can the maintenance head insure a return on investment and profits for his company.

Responsibilities

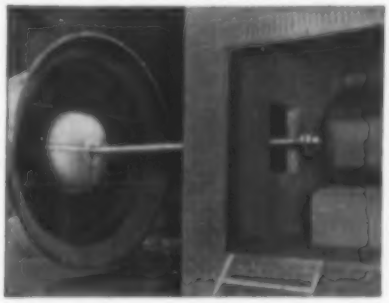
These changing requirements for maintenance have shown that the maintenance head's responsibility is undergoing a marked change. They also foretell several requirements if he is to discharge these responsibilities today and in the future. As a minimum, he will need the following:

1. Improved administrative controls to provide maximum organizational performance and optimum maintenance cost.
2. Improved selection, training and upgrading of mechanics to provide the skills required to maintain the new equipment and processes.
3. Improved tools and techniques to insure the most effective use of the skills developed in his mechanical force.
4. Improved preventive and corrective maintenance programs to reduce equipment outage to a minimum, insure continuity of operation, and assure high quality and quantity production which are imperative to provide maximum profits and return on investment.

Under administrative controls, the maintenance head first must have a technique to evaluate the over-all performance of his organization which will indicate the effect on the mill cost of the product. He must be able to determine the most effective improvement program for his particular organization and then have a yardstick by which to measure improvements resulting from execution of his program.

Any method developed to evaluate a plant's maintenance performance must take into consideration many variable factors which affect that performance, instead of just a single factor such as maintenance cost as per cent of investment or maintenance unit cost.

Eliminate Intermediate Bearings !



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The large fan shown above is 16' from the motor to allow sufficient air intake. Miners working underground receive their fresh air supply from this fan and others like it, which have been giving dependable service for as long as fifteen years . . . without shutdowns for lubrication or maintenance of the couplings.

Thomas floating shaft flexible couplings are recommended for machine and marine drives, printing presses, paper and cement mills, cooling towers, diesel engines, pumps, compressors, and many other uses.

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UNDER LOAD and MISALIGNMENT

1. Freedom from Backlash—Torsional Rigidity
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3. Smooth Continuous Drive with Constant Rotational Velocity
4. Visual Inspection in Operation
5. Original Balance for Life . . . *and*

Thomas All Metal Couplings have No Wearing Parts so Lubrication and Maintenance are Eliminated

Write for Engineering Catalog 51A

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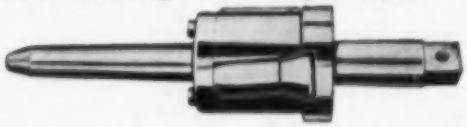

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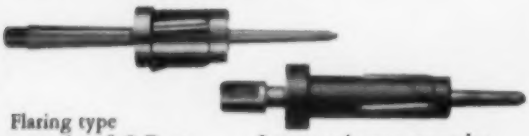

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Thermal Engr. Co. — Marley Co.

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Decatur

Abernathy-Thomas Engr. Co. —Leslie Co.

Lambert Engineering Co. — Everlasting Valve Co.

St. Simons Island

Roy C. Crumbliss — Foster Engineering Co.; Leslie Co.

Savannah

Schirm Supply & Specialty Co. —Reliance Steel Prod. Co.

Stonewall

Guy Mankin — L. J. Wing Mfg. Co.

KANSAS

Kansas City

Herbert F. Zeigler, Jr. — Sterling Elec. Motors, Inc.

Mission

Hesler Co.—Prat-Daniel Corp. (Thermix)

Wichita

Economy Equipment Co. — Magnetrol, Inc.; Reliance Gauge Column Co.; Webster Engr. Co.

Heaven Engr. Co. — Orr & Sembower, Inc.

Smith Steam Specialty Co., Geo. Foulds Co.—Sarco Co., Inc.

Sullivan-Mears Co. — Graver Water Cond. Co.

KENTUCKY

Fern Creek

George Parnson — Ellison Draft Gage Co.

J. Zimmerman—Fisher Governor Co.; Leslie Co.

Lexington

Brock-McVey Co. — Cleaver-Brooks Co.

Louisville

The Abbott Company — Magnetrol, Inc.

Cardinal Carryor Co.—American Monorail Co.

Comley-Bushfield Co. — E. Keeler Co.

Consolidated Engr. Sls. Co.—Sarco Co., Inc.

Allan K. Cook Co. — Fisher Governor Co.

Fletcher Sales Co. — Cyclotherm Div.

Alfred Halliday Co. Inc. — Dean Hill Pump Co.

Halmar and Co. — Orr & Sembower, Inc.

Jay Instrument & Specialty Co.—Mason-Neilan Div.

F. W. Jenike Co. — Prat-Daniel Corp. (Thermobloc)

H. M. Lutes—Buffalo Forge Co.

George Parnson—Ernst Water Column & Gage Co.

Rietze & Co. — Allen-Bradley Co.

Steel Fabricators, Inc. — Borden Metal Prod. Co.

Frederick Wehle—Continental Gin Co.

LOUISIANA

Baton Rouge

Moody-Price, Inc. — The Annin Co.

Lake Charles

A. M. Lockett & Co. Ltd.—Babcock & Wilcox Co., Sturtevant Div.; Worthington Corp.

New Orleans

Acme Welding & Supply Co. —Dameron Enterprises, Inc.

Felix L. Alcus—Clarage Fan Co.

Allied Sls. & Serv. Inc. — Durametallic Corp.

Arlexco Company, Inc.—Prat-Daniel Corp. (Thermix)

Pierre E. Bagur, Jr., & Co.—Prat-Daniel (Thermobloc)

Bets Engr. Sales Co.—Elgin Softener Corp.; U. S. Elec. Motors; Warren Steam Pump Co.

Frank Birdsong — Sarco Co., Inc.

John H. Carter Co. — Fisher Governor Co.; Reliance Gauge Column Co.; Republic Flow Meters Co.; Thos. C. Wilson, Inc.

Coastal Engineering Corp. — Graver Water Cond. Co.; Mason-Neilan Div.

Walter S. Cooke — American Blower Co.; Ross Heat Exchanger Div.

Creole Engineering Co. — Ernst Water Column & Gage Co.; Leslie Co.

L. Villere Cressy — Powers Regulator Co.

Cutler Equip. Co. — Brown-Boveri Corp.; C. H. Wheeler Mfg. Co.

Joseph V. D'Amico, Jr. — Armstrong Machine Works

H. R. Davies Sls. & Engr. — Robvon Backing Ring Co.

Devlin Bros. — Buffalo Forge Co.; Orr & Sembower, Inc.

John V. Dugan — Pittsburgh Piping & Equip. Co.

Arthur Duvic's Sons — Frick Co.

Eggelhof Engineers — Cyclotherm Div.; Ellison Draft Gage Co.; Everlasting Valve Co.; Magnetrol, Inc.

Factory Sls. & Engr. Co., Inc. —L. J. Wing Mfg. Co.

Frank P. Fischer Engr. Co.— Cleaver-Brooks Co.; Marley Co.; Webster Engr. Co.

D. B. Fried—Clarage Fan Co.

Gulf Engr. Co. Inc.—Leslie Co.

Allan J. Harris Company — Cochrane Corp.

Arthur C. Hays—Blaw-Knox Co., Equip. Div. (Grating)

Industrial Machinery Inc. — Reliance Steel Prod. Co.

Kelleher Engr. Sales Co. — C. H. Wheeler Mfg. Co.

A. M. Lockett & Co. Ltd. — Babcock & Wilcox Co., Sturtevant Div.; Worthington Corp.

Louisiana Elevator Co.—The J. B. Ehrsam & Sons Mfg. Co.

McLellan Supply Co. — Dean Hill Pump Co.

Marshall, Neil & Pauley — Warner Lewis Co.; Western Precipitation Corp.

Mechanical Equipment Co. — Goulds Pumps Inc.; National Supply Co.

A. K. Miller Sls. & Engr. Co. —Webster Engr. Co.

Edgar Murray Supply Co. — American Gilsonite Co.

Robbins & Robbins — Allen-Bradley Co.

RoCo Equip. Co. — Childers Mfg. Co.

Sintes Sales Engineers — American Monorail Co.

Southern Engine & Pump Co. —Peerless Pump Div.

Taylor - Seidenbach, Inc. — Johns - Manville Sls. Corp.

R. J. Tricon Co.—L. J. Wing Mfg. Co.

Williamson Sales Co.—Subox Inc.

Shreveport

J. P. Ashcraft Co.—E. Keeler Co.; Prat-Daniel Corp. (Thermobloc)

John H. Carter Co. — Fisher Governor Co.; Reliance Gauge Column Co.; Repub. Flow Meters Co.; Thos. C. Wilson, Inc.

J. C. Cherry Company — Cyclotherm Div.; Sarco Co., Inc.

L. A. DeJean — Fiske Bros. Refining Co.

Dykes Co. Inc. — Leslie Co.; Prat-Daniel Corp. (Thermobloc)

Eggelhof Engineers — Cyclotherm Div.; Ellison Draft Gage Co.; Everlasting Valve Co.; Magnetrol, Inc.

A. M. Lockett & Co. Ltd. — Babcock & Wilcox Co.; Sturtevant Div.; Worthington Corp.

Maintenance Engr. Corp. — Mason-Neilan Div.

The Williamson Sales Co. — Subox, Inc.

R. F. Zimmerman Co. — Clarage Fan Co.

MARYLAND

Baltimore

H. B. Brown Co. — American Monorail Co.

W. I. Collier & Co.—Powers Regulator Co.

Easter & Woodward, Inc. — Superior Comb. Ind., Inc.

Energy Control Corp.—Foster Engineering Co.; Magnetrol, Inc.

General Automatic Corp. — Cyclotherm Div.

Hersche Packing Co. — Belmont Packing & Rubber Co.

Harry Jobe Company—Childers Mfg. Co.; Western Precipitation Corp.

Lamb Engineering Co.—Elgin Softener Corp.; Everlasting Valve Co.; National Conveyors Co.

McCall-Boykin Co. Inc. — Manning, Maxwell & Moore, Inc.

William A. Milby Co. Inc. — Cochrane Corp.; Goulds Pumps Inc.

J. F. Murray Co. — Warren Steam Pump Co.

Owings Supply Co.—Everlasting Valve Co.

J. E. Perkins Corp. — Sarco Co., Inc.

Power & Combustion, Inc. — Todd Shipyards Corp.

Edward Renneburg & Sons Co. —Webster Engr. Co.

Paul V. Renoff Co. — Edwin L. Wiegand Co.

Rhodes Controls Co. — Fisher Governor Co.

H. P. Rodgers—Ellison Draft Gage Co.;! Marley Co.

George J. Sturmfels—American Engineering Co.

Tate Engr. & Supply Co. Inc. —Leslie Co.; Orr & Sembower, Inc., Peerless Pump Div.; Thos. C. Wilson, Inc.

Tate & Hewitt—Clarage Fan Co.

H. M. Wood & Co. — Allen-Bradley Co.

MISSISSIPPI

Jackson

Engineering Sales Co.—Dollinger Corp.

F. J. Evans Engr. Co.—Webster Engr. Co.

Palmer Air Cond. & Heating Co. — Prat-Daniel Corp. (Thermobloc)

Robert Porter—Sarco Co., Inc.

A-T-M Gas Equip. Co.—Orr & Sembower, Inc.

MISSOURI

Kansas City

D. M. Allen Co. — Childers Mfg. Co.

Burke Engineering Co. — Warner Lewis Co.

W. C. Carolan Co. — National Conveyor Co.

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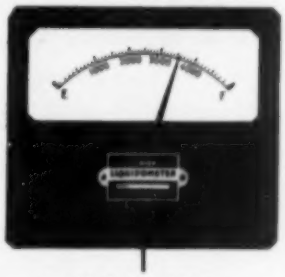
* For further details of equipment I refer you to the table of equipment. Good accessories are so essential to an efficient plant — Marathon is blessed with a careful, experienced selection of proven, dependable auxiliary units. I've enjoyed my visit down here to the Keys, a[s] I did last year. The cooperation extended me by [ma]ger Leonard Martin of the Coop, Bill Nicholls Griffin of the engineering staff has help[ed] is sincerely appreciated.

* EQUIPMENT TABLE

Exhaust mufflers-Burgess-Manning
Batteries-Gould
Fuel transfer and unloading pumps-Roper
Primary and Secondary fuel heaters-Ross
Fuel oil filters-Purolator
LIQUID LEVEL GAUGES-LIQUIDOMETER JR.
Fuel oil meter-Rockwell
Fuel oil gauges-DeLaval
Fuel oil strainer (final)-Air-Maze
Final fuel oil heater-Chemalux Immersi-
Steam condenser-Ross
Turbine-spray water cooler-Ross
Switchboard-Westinghouse
Controlling Engineers-E. P. M. Lectr.

* *Excerpts from "Marathon Converts to Heavy Fuel," in Diesel Progress, March 1957.*



The "Junior" model shown here was used in the above installation. It has a 7" x 6¼" case.

Liquidometers are selected for the liquid level gauging where dependability and durability are required. Remote indication is provided by a closed hydraulic transmission system which supplies a completely automatic and instantaneous reading of tank contents without use of an outside source of power. All models feature large easy to read dials designed to fit individual requirements. Liquidometers are giving years of trouble-free operation in all types of industry and moving vehicles. Write for information on the complete Liquidometer automatic gauging line.

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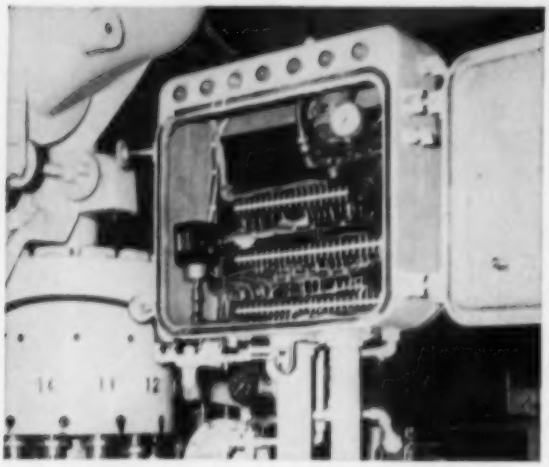

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Southern Sales Service (Continued)

The Condit Company — Ernst Water Column & Gauge Co.; Manning, Maxwell & Moore, Inc.; Mason-Neilan Div.

F. S. Crook & Associates — Elgin Softener Corp.

J. W. Donahower & Assoc.—American Monorail Co.

Robert H. Douglas—Cleveland Tramrail Div.

Economy Equipment Co. — Foster Engr. Co. (Valves); Magnetrol, Inc.; Reliance Gauge Column Co.; Webster Engr. Co.

C. A. Flarsheim—L. J. Wing Mfg. Co.

C. H. Garrison Company — Niagara Blower Co.

Heaven Engineering Company —Clarage Fan Co.; Orr & Sembower, Inc.; Prat-Daniel Corp. (Thermobloc)

J. J. Heinrickson & Son — Blackmer Pump Co.

The Hesler Co. — Cleaver-Brooks Co.; Copes - Vulcan Div.; Prat - Daniel Corp. (Thermix); C. H. Wheeler Mfg. Co.

Hughes Machinery Co.—Riley Stoker Corp.

Roy F. Johnson — Dean Hill Pump Co.

Kansas City Equipment Co.—Brown-Boveri Corp.

Wm. A. Knapp Company — Geo. D. Roper Corp.

L. B. McCreary & Son—Allen-Bradley Co.; Sprague Electric Co.

Harry McPherson — Detroit Stoker Co.; Western Precipitation Corp.

Messplay Machinery Co. — Cochrane Corp.

Midwestern Power Equip. Co. —Buell Engineering Co.

Mooney Engineering Co. Inc. —Leslie Co.

Fraser D. Moore Co.—Edwin L. Wiegand Co.

Smith Steam Specialty Co. — Sarco Co., Inc.

Snyder Company — Foster Engr. Co. (Flow Tubes)

Burton Sorkin — Everlasting Valve Co.

Sullivan-Mears Co. — Fisher Governor Co.; Graver Water Cond. Co.

E. M. Thompson — Niagara Blower Co.

Western Engr. & Sup. Co. — Ellison Draft Gage Co.

St. Louis

B & B Combustion Equip. Co. —Buell Engineering Co.; Detroit Stoker Co.; National Airoil; Niagara Blower Co.; Superior Comb. Ind., Inc.

E. H. Bigden—Geo. D. Roper Corp.

Central Pump & Equipment Co.—Goulds Pumps Inc.

J. W. Cooper—Buffalo Forge Co.

F. S. Crook & Associates — Elgin Softener Corp.

Economy Equipment Co. — Foster Engr. Co. (Valves); Magnetrol, Inc.; Prat-Daniel Corp. (Thermix); Reliance Gauge & Column Co.; Webster Engr. Co.; Thos. C. Wilson, Inc.

C. B. Fall Company—Edwin L. Wiegand Co.

Carl F. Gast Co. — Ellison Draft Gage Co.; Manzel

General Elevator Eng. Co.—The J. B. Ehrsam & Sons Mfg. Co.

General Equipment Co. — Warner Lewis Co.

Peter S. Grandcolas—Borden Metal Prod. Co.

Howell Engr. Equipment Co.—Copes-Vulcan Div.; Goulds Pumps Inc.; Graver Water Cond. Co.

Ross Irwin Equip. Co.—Dean Hill Pump Co.

Roger P. Kipp Co.—Leslie Co.

Lane Machinery Co. — Cochrane Corp.

R. F. Leinberger—Blackmer Pump Co.

George R. McFarland — Sterling Elec. Motors, Inc.

Midvale Mtl. Hdl. Equip. Co.—American Monorail Co.

Medor, Inc. — National Conveyor Co.

Midwest Machinery Co. — Marley Co.

O'Brien Equipment Company — Manning, Maxwell & Moore, Inc.; Mason-Neilan Div.

George W. Pickson — Sarco Co., Inc.

Gid Porter Company — Prat-Daniel Corp. (Thermobloc)

Reeves & Skinner Mchy. Co.—American Engr. Co.

Rhodes Equipment Co. — Clarage Fan Co.; Riley Stoker Corp.

C. W. Schalchlin — Allen-Bradley Co.

Heaven Engr. Company — Clarage Fan Co.

Skinner Supply Co. — Orr & Sembower, Inc.

Springfield

Heaven Engr. Co. — Orr & Sembower, Inc.

NORTH CAROLINA

Charlotte

Ace Elevator Co.—The J. B. Ehrsam & Sons Mfg. Co.

Oliver L. Ballard & Sons — Thos. C. Wilson, Inc.

Clark H. Broward — Madden Corp.; Superior Comb. Ind., Inc.

Brown & Morrison—Cochrane Corp.

Kirk Cousart & Associates—Marley Co.

Gas Heat Distributors, Inc.—Webster Engr. Co.

The Hawkins-Hamilton Co.—Copes - Vulcan Div.; Terry Steam Turbine Co.

T. C. Heyward—Combustion Engr., Inc.; Prat - Daniel Corp. (Thermix); C. H. Wheeler Mfg. Co.

Robert S. Hudgins, Jr.—Leslie Co.

R. H. Johnson Co. — Cyclotherm Div.

Robert E. Mason & Co. — Clarage Fan Co.; Fisher Governor Co.; Goulds Pumps Inc.

E. L. Mountcastle — National Conveyor Co.

Mec-Tric Control Company — The Annin Co.; Reliance Gauge Column Co.; Magnetrol, Inc.

Paul H. Nichols & Co.—Pittsburgh Piping & Equip. Co.; Riley Stoker Corp.

James T. Potter — Western Precipitation Corp.

Pump & Lighting Co.—Peerless Pump Div.

Purser and London, Inc. — Ross Heat Exchanger Div.; L. J. Wing Mfg. Co.

Ranson, Wallace & Co. — Edwin L. Wiegand Co.

M. P. Sossomon Engr. Co. — Cyclotherm Div.

Leroy T. Spoon—Allen-Bradley Co.

J. Fred Welch — Fiske Bros. Refining Co.

Greensboro

Applied Engr. Co. Inc. — Cleaver-Brooks Co.; Manning, Maxwell & Moore, Inc.; Prat-Daniel Corp. (Thermobloc); Todd Shipyards Corp.

Hoffman & Hoffman Co. — Sarco Co., Inc.

Max I. Miller — Sterling Elec. Motors, Inc.

R. K. Rouse—Leslie Co.

Allan T. Shepherd Co.—L. J. Wing Mfg. Co.

P. O. Stribling, Jr.—Detroit Stoker Co.

W. R. Phillips — Edwin L. Wiegand Co.

Raleigh

Dillon Supply Co. — American Gilsonite Co.; Orr & Sembower, Inc.

L. R. Gorrell Co. — Childers Mfg. Co.

Hoffman & Hoffman Co. — Sarco Co., Inc.

Max I. Miller — Sterling Elec. Motors, Inc.

OHIO

Cincinnati

The Abbott Co. — Magnetrol, Inc.

A. A. Betts Co. — Leslie Co.

Chapman-Engr. Sales Co. — Foster Engineering Co.; Reliance Gauge Column Co.

Cincinnati Steel Products Co. —Borden Metal Products Co.

Consolidated Engr. Sls. Co.—Sarco Co., Inc.

Dravo Corporation — C. H. Wheeler Mfg. Co.

Ellman Equip. Co. — Prat-Daniel Corp. (Thermix)

Joseph H. Fallon — Sterling Elec. Motors, Inc.

J. A. Gerlach—Western Precipitation Corp.

Smith E. Hughes — National Conveyor Co.

W. L. Jaeckel—Allen-Bradley Co.

F. W. Jenike Co.—Prat-Daniel Corp. (Thermobloc)

Jordan Engr.—Childers Mfg. Co.

W. R. Knight — Dean Hill Pump Co.

Lathrop-Trotter Co. — Terry Steam Turbine Co.

McLean-Peterson Co.—Ellison Draft Gage Co.

Morheat Distribution, Inc. — Orr & Sembower, Inc.

George T. Oberklein & Assoc. —Ill. Water Treatment Co.; Thos. Flexible Coupling Co.; U. S. Hoffman Mchy. Corp.

Harry T. Porter & Co. — Chapman Valve Co.; Fisher Governor Co.

Howard C. Roller—L. J. Wing Mfg. Co.

Scott Mtl. Handling Co. — American Monorail Co.

The Smysor Co. — Edwin L. Wiegard Co.

Surface Combustion Corp. — Webster Engr. Co.

H. P. Thompson Co.—Cochrane Corp.; Copes-Vulcan Div.

White Ind. Sls. & Equip. — Peerless Pump Div.

Wikel & Cornelius, Inc. — Goulds Pumps Inc.; Riley Stoker Corp.

Wilcox Engineering Co. — Elgin Softener Corp.; McAlear Mfg.; Warren Steam Pump Co.; Thos C. Wilson Co.

OKLAHOMA

Oklahoma City

Elevator Sales & Service — The J. B. Ehrsam & Sons Mfg. Co.

Paul Berry Inc.—Allen-Bradley Co.; Sprague Electric Co.; Edwin L. Wiegand Co.

Federal Corporation—Webster Engr. Co.

William S. Golden—E. Keeler Co.

Loeffler-Greene Supply Co. — American Gilsonite Co.; Clarage Fan Co.

Murray R. Womble Co. — Reliance Steel Prod. Co.

Ponca City

Kappele Engineering Co. — Leslie Co.

Tulsa

Arduser & Co.—Elgin Softener Corp.

Edward C. Bromiley—Mansel

Fred Colbert—Webster Engr. Co.

The Condit Company — Ernst Water Column & Gauge Co.; Manning, Maxwell & Moore, Inc.; Mason-Neilan Div.

James E. Dyer Company — Thos. C. Wilson, Inc.

R. L. Eaton—Kalamazoo Tank & Silo Co.

Allan Edwards, Inc.—Magnetrol, Inc.

Eggelhof Engineers — Cyclotherm Div.; Ellison Draft Gage Co.; Everlasting Valve Co.

J. W. Elder — Allen-Bradley Co.

W. D. Emery Co.—Duralmetallic Corp.; Jerguson Gage & Valve Co.

Irons Engineering Co. — Warner Lewis Co.

Tom Krieg Co. — Orr & Sembower, Inc.

The Laney Co.—Copes-Vulcan Div. (Vulcan); Ross Heat Exchanger Div.

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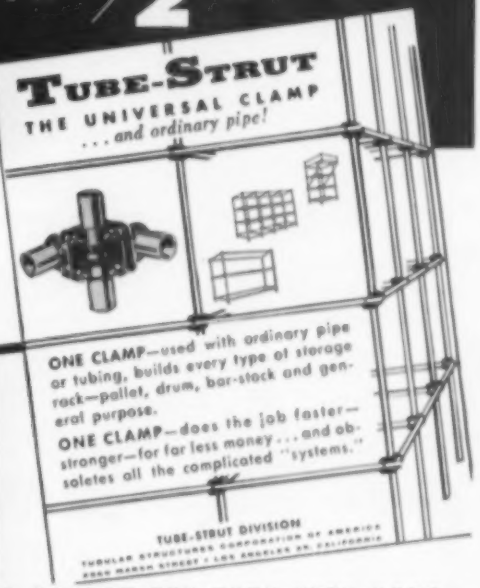
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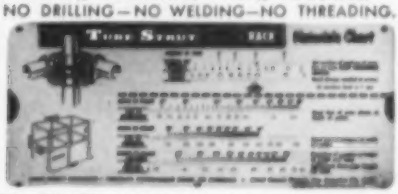

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Banks-Miller Supply Co. 330 Third Ave. Huntington, W. Va.

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Company _____ Position _____

Street _____

City _____ State _____ SPI

Southern Sales Service (Continued)

Loeffler-Greene Supply Co. — Clarage Fan Co.

R. E. Martin — Prat-Daniel Corp. (Thermobloc)

McGregor Engineering Co. — Byron Jackson Pumps, Inc.

L. D. McKay & Co. Inc. — Blackmer Pump Company; Leslie Co.; Reliance Gauge Column Co.

Ben McKalip Co.—The Annin Co.

Mooreland Co. — Manning, Maxwell & Moore, Inc.; National Tube Co.; Wm. Powell Co.; Henry Vogt Machine Co.

Process Equipment Co. — Buffalo Forge Co.; Graver Water Cond. Co.

Riddle & Hubbell — Terry Steam Turbine Co.

Snyder Company, Inc.—Foster Engr. Co. (Flow Tubes); Panellit, Inc.; Republic Flow Meters Co.

Stewart Engr. & Equip. Co.—American Monorail Co.

Thilenius Equipment Co. — Dollinger Corp.

Vanco Engr. Co.—Dean Bros. Pumps, Inc.; Prat-Daniel Corp. (Thermix); Sarco Co., Inc.

Victory Supply Co.—Dean Hill Pump Co.

Vinson Supply Co. — Copes-Vulcan Div. (Copes); Fisher Governor Co.

Westcott & Greis, Inc. — Reliance Gauge Column Co.

Murray R. Womble—Reliance Steel Prod. Co.

SOUTH CAROLINA

Anderson

C. M. Guest & Sons—E. Keeler Co.

Columbia

Boiler Sales Co., Inc. — Orr & Sembower, Inc.

Hoffman & Hoffman Co. — Sarco Co., Inc.

Greenville

J. Edgeworth Beattie — Reliance Steel Prod. Co.

Coleman Company, Inc. — Fairbanks Co.

Hoffman & Hoffman Co. — Sarco Co., Inc.

Roy A. Stipp—Buffalo Forge Co.

Tom Wellborn—Lovejoy Flexible Coupling Co.

Orangeburg

Applied Engr. Co. Inc. — American Gilsonite Co.; Cleaver-Brooks Co.; Prat-Daniel Corp. (Thermobloc)

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Allan G. Brown — Ill. Water Treatment Co.

Daugherty Supply Co.—Cleaver-Brooks Co.

Equipment & Supply Company—Leslie Co.

L. M. Flanary—Powers Regulator Co.

McKinney Supply Co.—American Monorail Co.

D. L. McNulty—W. H. Nicholson Co.

Manufacturers Distributors Co.—Eutectic Welding Alloys

H. R. Miles & Assoc.—Edwin L. Wiegand Co.

Edgar A. Rogers—Foster Engineering Co.; Prat-Daniel Corp. (Thermix)

Kingsport

Abernathy-Thomas Engr. Co. —Leslie Co.

Knoxville

Automatic Heating & Equip. Co.—Orr & Sembower, Inc.

Boiler Supply Co. — Prat-Daniel Corp. (Thermobloc

Bowditch & Co.—Allen-Bradley Co.

Dickey Engineering Co. — Cochrane Corp.; Copes-Vulcan Div.; Ellison Draft Gage Co.

John M. Dooley & Assoc. — American Gilsonite Co.

Gerguson Equipment Co. — Marley Co.

Gas Equip. Engineers, Inc. — Webster Engr. Co.

Alfred Halliday Co. Inc. — Dean Hill Pump Co.

Leinart Engineering Co. — Cleveland Tramrail Div.; U. S. Hoffman Mchy. Corp.; Thos. C. Wilson Inc.

McGinnis-Hill Co. — Orr & Sembower, Inc.

John G. Pettyjohn — Brown-Boveri Corp.; Sprague Electric Co.

C. F. Sexton — Buffalo Forge Co.

G. Walter Sutton & Son — Peerless Pump Div.; Sarco Co., Inc.

Tenn. Heating & Sales Co. Inc. — Cleaver-Brooks Co.

Z. L. Witt—Clarage Fan Co.

Memphis

Allen-Shuff Corp.—Buell Engineering Co.; Detroit Stoker Co.; Graver Water Cond. Co.

Gilbert H. Avery — Ellison Draft Gage Co.

Crawford Jordon — Allen-Bradley Co.

C. W. Dean & Assoc.—Goulds Pumps Inc.

Dixie Engr. Supply Co.—Frick Co.

Engineered Instrument Sls. Co.—Panellit, Inc.

C. J. Gaskell Co. Inc.—Buffalo Forge Co.; Copes-Vulcan Div. (Copes); Foster Engr. Co.; Magnetrol, Inc.; Webster Engr. Co.; Thos. C. Wilson, Inc.

Alfred Halliday Co.—Dean Hill Pump Co.

Holmes Engineering Co. — Cyclotherm Div.

Hurston - Conaway, Inc. — American Gilsonite Co.; Clarage Fan Co.

Ind. Boiler & Equipment Serv. —Superior Combustion Ind., Inc.

Johnson & Scott—Fisher Governor Co.; L. J. Wing Mfg. Co.

J. B. Lammons Co. — Sarco Co., Inc.

Mullins Engr. Co. — Prat-Daniel Corp. (Thermobloc)

T. J. O'Brien Engr. Co. — American Blower Corp.; Marley Co.

Power Equipment Co.—Childers Mfg. Co.; Leslie Co.

Robert James Rier — Geo. D. Roper Corp.

Southern Sales Co. — Powers Regulator Co.

The Southern Co.—The J. B. Ehrsam & Sons Mfg. Co.; Warner Lewis Co.

E. E. Torkell—Sprague Electric Co.

Clyde L. Wells—Sterling Elec. Motors, Inc.

Nashville

Allen - Shuff Corp. — Buell Engineering Co.; Detroit Stoker Co.; Graver Water Cond. Co.

Andersons, Inc. — American Monorail Co.

William C. Armistead Co. — Clarage Fan Co.; McAlear Mfg. Co.

Boiler Supply Co. — Orr & Sembower, Inc.; Prat-Daniel Corp. (Thermobloc); Thos. C. Wilson, Inc.

Foster Engr. & Equipment Co. —Cleaver-Brooks Co.; Webster Engr. Co.

R. E. Gardner Co.—Sarco Co., Inc.

Johnson & Scott—Fisher Governor Co.

W. J. LaPierre—Borden Metal Prod. Co.

H. R. Miles & Assoc.—Edwin L. Wiegand Co.

Power Specialty Co. — Ernst Water Column & Gage Co.

Southern Sales Co. — Powers Regulator Co.

TEXAS

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S. C. Covington Co. — Leslie Co.

General Sales Inc. — Durametallic Corp.

A. M. Lockett & Co.—Babcock & Wilcox Co.; Sturtevant Div.; Worthington Corp.

Mooreland Company — Wm. Powell Co.

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Langhammer-Rummel Co. — Buffalo Forge Co.

Corpus Christi

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Marshall, Neil & Pauley — Western Percipitation Corp.

Matthews Engr. Co.—Niagara Blower Co.

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Paul Simmons Co. — Elgin Softener Corp.

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Toole & Cunningham — Dean Hill Pump Co.

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Williamson Sales Co.—Subox, Inc.

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Don A. Carpenter & Co. — Buffalo Forge Co.; Goulds Pumps Inc.

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M. N. Dannenbaum Co.—Peerless Pump Div.; Thos. Flex. Coupling

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George D. Meyer, Inc.—Dean Hill Pump Co.

Gulf Engineering Co.—Leslie Co.

Gulf States Specialties Inc.—Foster Engineering Co.

Hewitt Mechanical Spec. — Elgin Softener Corp.

G. D. Hines—Clarage Fan Co.

Howell Engr. Co.—Cyclotherm Div.

Industrial Equip. Co.—Magnetrol, Inc.

Johnson-Heyck Company — Copes-Vulcan Div. (Vulcan)

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A. M. Lockett & Co.—Babcock & Wilcox Co.; Sturtevant Division; Worthington Corp.

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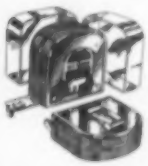

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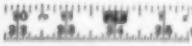

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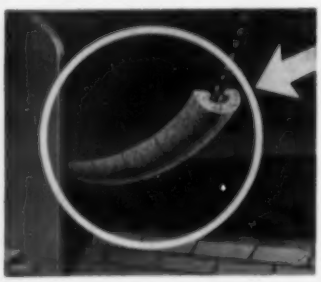

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FUTURE EVENTS of Engineering Interest

May 3: 48th Annual Exposition and Power Show, The University of Texas, **Austin, Texas.** T. A. Carlton, Public Rel. Chairman, Office of the Dean of the College of Engineering, The University of Texas, Austin 12, Tex.

May 16-17: Wood Industries Conference, ASME, **Winston-Salem, North Carolina.**

May 16-17: "The Age of Space" nontechnical conference; Southern Research Institute, **Birmingham, Ala.** Includes visit to Redstone Arsenal. R. D. Osgood, Jr., Asst. Dir., Southern Research Institute, Birmingham 5, Ala.

May 20-23: Design Engineering Show, New York Coliseum, **New York, N. Y.** 375 exhibits — ASME Design Engineering Conference. Clapp & Poliak, Inc., 341 Madison Ave., New York, N. Y.

May 20-23: 29th Annual Conference & Exhibit, Oil & Gas Power Div. of ASME, Kentucky Hotel, **Louisville, Ky.**

June 4-5: Power Rectifier Conference: American Institute of Electrical Engineers; Morrison Hotel, **Chicago, Ill.** Raymond C. Mayer & Assoc., 36 West 46th St., N. Y. 36, N. Y.

June 9-13: Fourth International Automation Exposition and Congress: New York Coliseum, **New York.** Richard Rimbach, Assoc., Management, International Automation Exposition, 845 Ridge Ave., Pittsburgh 12, Pa.

June 9-13: Semi-Annual Meeting, ASME, Sheraton - Palace Hotel, **San Francisco, Calif.**

June 14: Accident Prevention Conference, Public Utilities Association of the Virginias, Daniel Boone Hotel, **Charleston, West Virginia.** R. W. McKinnon, Exec. Sec., PUA of the Virginias, 5 Franklin Rd., Roanoke, Va.

Sept. 20-21: 39th Annual Meeting, Public Utilities Association of the Virginias, Greenbrier Hotel, **White Sulphur Springs, W. Va.** R. W. McKinnon, Exec. Sec., PUA of the Virginias, 5 Franklin Rd., Roanoke, Va.

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Starts Page 128

NEW BOILERS

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Boilers have never been fired. Can be supplied with any type burner equipment.

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In JENKINS *Monel-seated Bronze Gates*

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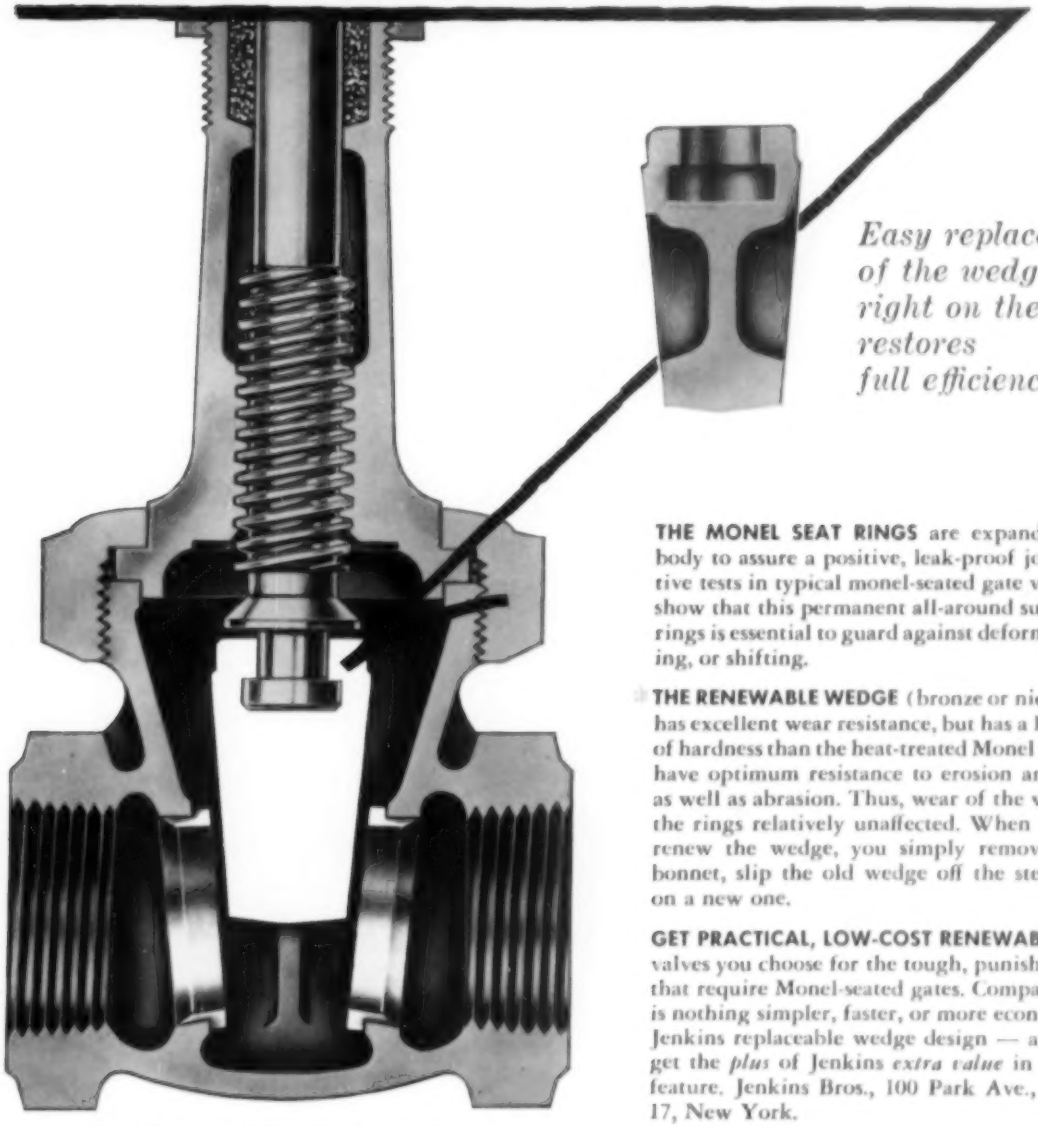

Easy replacement of the wedge only — right on the line — restores full efficiency

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200 psi	300 psi
Fig. 270-U, Bronze Wedge	Fig. 280-U, Bronze Wedge
Fig. 270-UN, Nickel Alloy Wedge	Fig. 280-UN, Nickel Alloy Wedge
Fig. 270-UL, Bronze Wedge, U.L. approved for L.P.G. Services	350 psi
	Fig. 280-UX, Bronze Wedge

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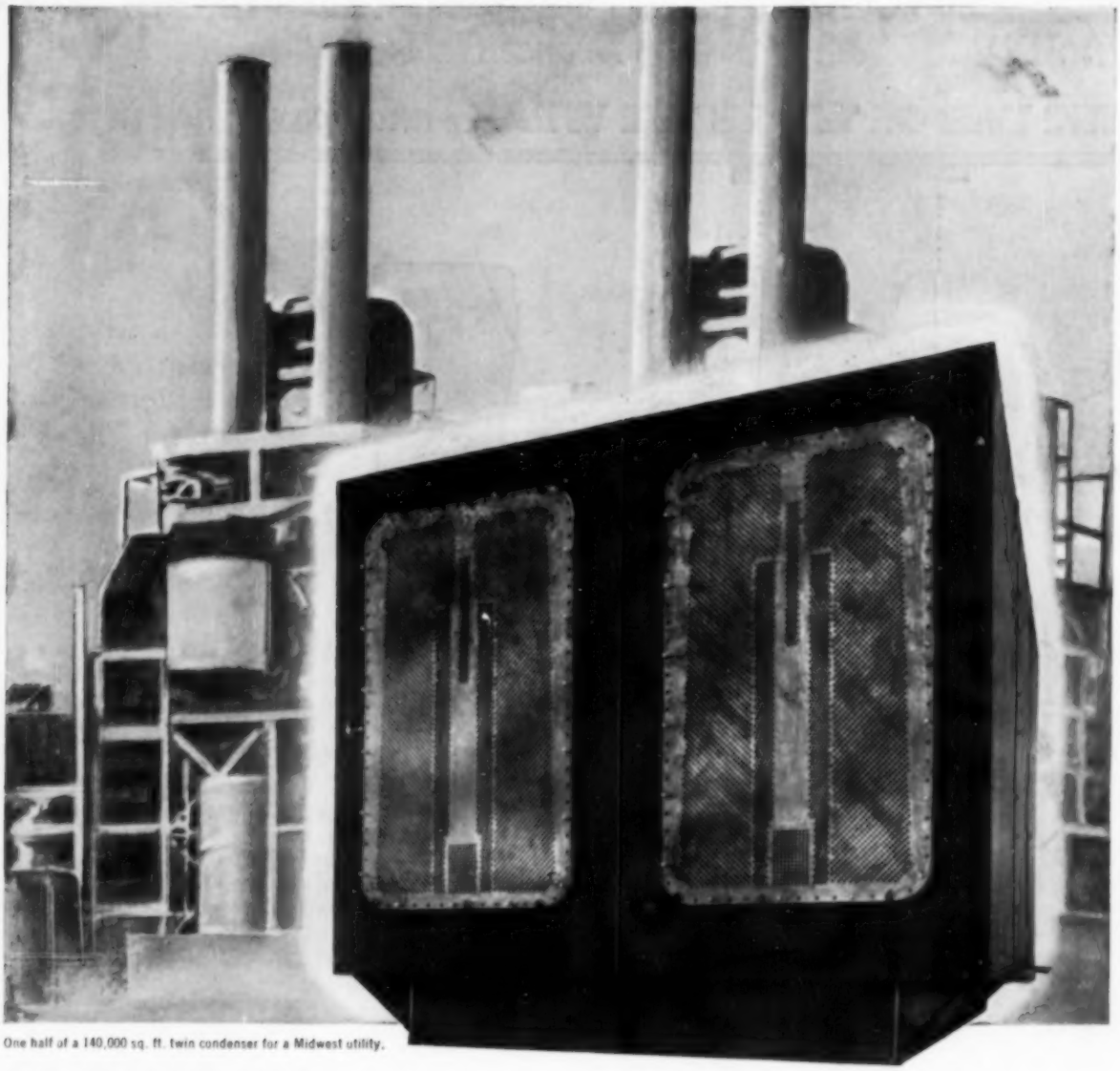

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